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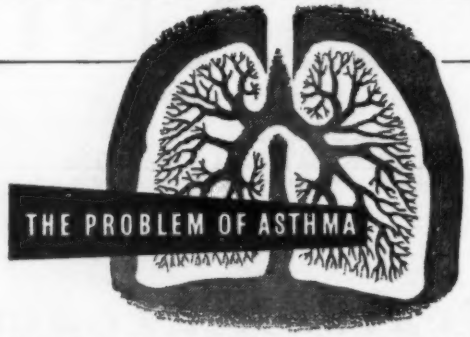

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CONTENTS

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ORIGINAL ARTICLES

Assessment of Blood-loss in Civilian Trauma — RUSCOE CLARKE, F.R.C.S., ELIZABETH TOPLEY, M.D., C. T. G. FLEAR, M.B. 629

Treatment of Pulmonary Sarcoidosis with Streptomycin and Cortisone — CLIFFORD HOYLE, F.R.C.P., JOHN DAWSON, M.R.C.P., GORDON MATHER, M.R.C.P. ... 638

Spastic Paraplegia of Middle Age — JOHN MARSHALL, M.R.C.P. 643

Tetracycline in Typhoid Fever — K. C. WATSON, M.B. 646

Pattern of the Human Tongue — B. T. SQUIRES, D.M. 647

Hepatic Abscess Secondary to Duodenal Ulcer — F. P. ANTIA, M.R.C.P., FRENY MARKER, M.B. 649

Optic Atrophy after Administration of Isoniazid with P.A.S. — P. H. SUTTON, M.R.C.P., P. H. BEATTIE, M.D. 650

Poliomyelitis Neonatorum — W. F. T. MCMATH, M.R.C.P. .. 651

PRELIMINARY COMMUNICATION

Technique for Demonstrating Neurosecretory Material in the Human Hypothalamus — C. W. M. ADAMS, M.B., J. C. SLOPER, M.R.C.P. 651

NEW INVENTIONS

An Instrument for Dividing Flexor Retinaculum — K. W. E. PAINE, F.R.C.S. 654

SPECIAL ARTICLES

Metallic Poisons and the Nervous System — J. W. ALDREN TURNER, F.R.C.P. 661

Lessons in Ward 10 — KAY VAUGHAN, N.F.U. 663

MEDICAL SOCIETIES

Royal Society of Medicine: Toxoplasmosis 652

REVIEWS

Notices of Books 653

LEADING ARTICLES

NUTRITION AND ANÆMIA 655

CLONAL AGEING 656

ANNOTATIONS

First-aid Treatment of Head Injuries 657

Backward in Reading 658

Psychiatric Evidence in Murder Trials 658

Calcium Deposits in the Hand .. 659

Tuberculin Tests 659

Handwriting and the Psyche 660

F.R.S. 660

PUBLIC HEALTH

French Public-health Services — J. S. COOKSON, M.D. 665

The Rôle of Local-authority Clinics 667

LETTERS TO THE EDITOR

Counting the Swabs (Mr. V. H. Riddell, F.R.C.S.) 669

Danger of Vitamin K to Newborn (Dr. A. C. Allison) 669

Isoniazid Resistance (Dr. G. Middlebrook, Dr. S. H. Dressler) 669

Sanatoria (Dr. R. S. Caldwell) 670

Clinical Staging of Carcinoma of the Breast (Mr. Michael Harmer, F.R.C.S.) 670

The Lowenfeld Mosaic Test (Dr. Margaret Lowenfeld) 671

Retrolental Fibroplasia (Dr. Th. Brehme) 671

Escherichia coli in Infantile Diarrhœa (Prof. Tohru Ogawa, M.D., Prof. Jiro Ogawa, M.D.) 671

Sickle-cell Trait in South Turkey (Dr. H. Lehmann) 672

Estimation of Mercury in Atmosphere (Dr. Donald Hunter and others) 672

Rupture of Laparotomy Wounds (Mr. Wilfrid Mills, M.R.C.O.G.; Mr. Anthony Walsh, F.R.C.S.I.) 673

A Shared Responsibility (Dr. Marjory Warren) 673

Yellow Phosphorus Poisoning (Dr. A. T. Todd) 673

Rabies in Germany (Mr. C. W. Wells, B.SC.) 674

Epidemic Vertigo (Dr. Bernard Freedman; Dr. M. Glass) 674

Osteo-arthritis of Luschka Joints (Dr. D. C. G. Cooper) 675

Innocuous Temporary Immobility (Dr. G. de M. Rudolf) 675

Jaundice (Mr. V. J. Downie, F.R.C.S.E.) 675

Enuresis (Dr. Hedy Symonds; Mr. D. F. Ellison Nash, F.R.C.S.) 676

Effective Circulation of Uterine Wall in Late Pregnancy (Dr. R. Schuurmans) 676

Inaccuracy in the Laboratory (Mr. O. Bassir) 677

Masked Epilepsy (Prof. R. S. Illingworth, F.R.C.P.; Dr. O. N. Ulutin) 677

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Hospital Reports for Industrial Medical Officers (Dr. L. J. Haydon) 677

Hospital Staffs (Dr. C. J. Dickinson) 678

Diagnosis of Active Carditis (Prof. G. Czoniczer, M.D., Dr. R. Szabó) 678

Hypothermia in the Newborn (Dr. Victoria Smallpeice; Dr. H. Everley Jones) 679

IN ENGLAND NOW

A Running Commentary by Peripatetic Correspondents 668

PARLIAMENT

Obscene Publications Bill 679

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MEDICINE AND THE LAW

An Overlooked Swab 680

A Death from Tetanus 680

OBITUARY

Max Neuburger 680

Charles Russ 680

NOTES AND NEWS

Prescription of Tetracycline 681

Onchocerciasis 681

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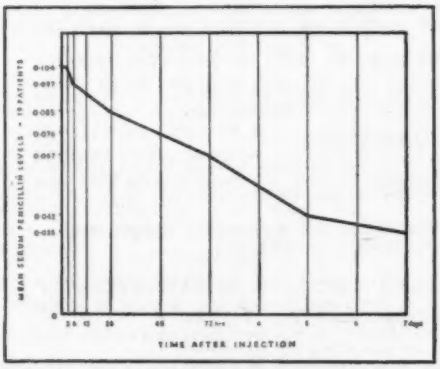

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consists of an acrylic resin dissolved in a mixture of acetic esters. When applied to the dry skin the solvent evaporates leaving an elastic, transparent, and adhesive film.

NOBECUTANE
has many advantages over conventional dressings. It is non-irritating, transparent, tough, pliable and durable and can be applied over joints where some degree of mobility is required.

NOBECUTANE
is impervious to bacteria but permeable to air and water vapour and allows normal aqueous exhalation of the skin to escape. No maceration of the skin occurs.

NOBECUTANE
is economical in use and results in a saving of at least 20% over the cost of conventional dressings. In addition it is welcomed by nursing staff who find it effects a considerable saving in time.

Packed and issued by the sole distributors

NOBECUTANE
is available in 300 ml. spray containers, holding sufficient solution to dress 60-70 surgical wounds. It is also available in bottles of 50 ml. and 250 ml.

Manufactured in Sweden by
A. B. BOFORS, NOBELKRUT

EVANS MEDICAL

EVANS MEDICAL SUPPLIES LTD.
LIVERPOOL & LONDON

552

Restoring natural rhythm

Senna is a neuro-muscular stimulant of peristalsis and produces a good imitation of normal defaecation. Such a physiological effect is of great value in restoring natural rhythm.

Through the production of Senokot, the first stable, standardised preparation of senna, the full therapeutic activity of the drug has been made available and its re-educative effect demonstrated.

Senokot

REGD.

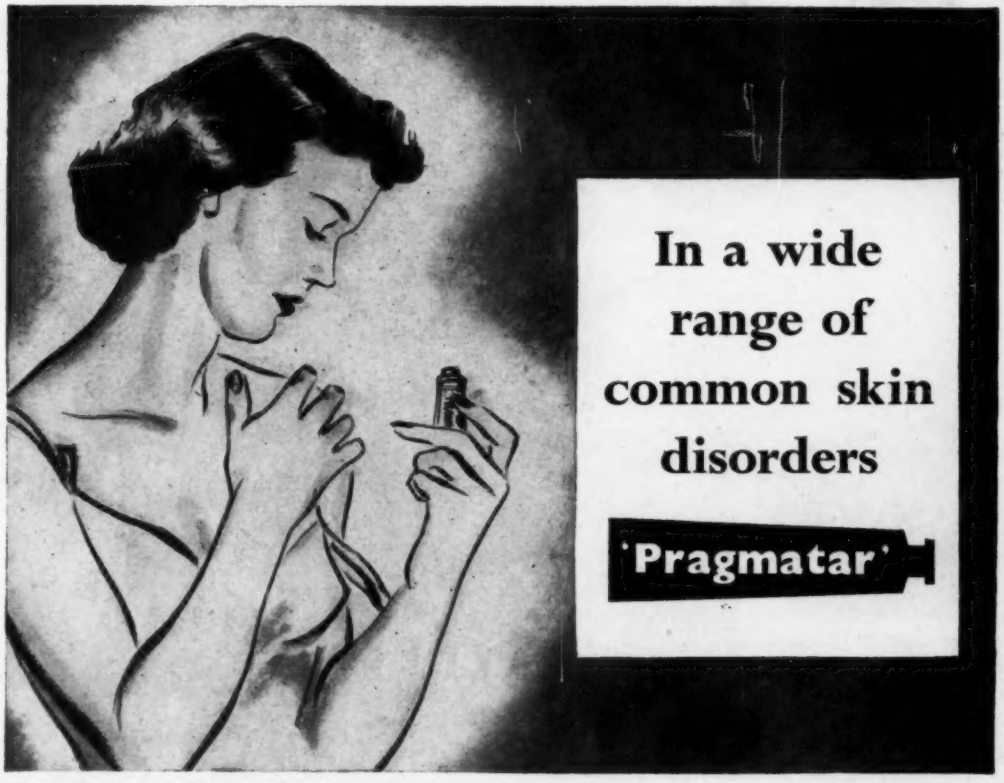
STANDARDISED SENNA GRANULES AND TABLETS

Lancet, 1952, **1**, 655.
ibid 1953, **1**, 497 and 602.
Practitioner, 1953, **170**, 266.
Medical Press, 1954, **231**, 521.

Prescribed on E.C.10.
—*J.C.P. Category 3.*
—*Not advertised to the public.*
—*Inexpensive*

GRANULES:
2 oz., 6 oz. and 2 lb.
TABLETS:
50, 200 and 1,000.

WESTMINSTER LABORATORIES LTD., CHALCOT ROAD, LONDON, N.W.1



— the outstanding tar-sulphur-salicylic-ointment — is effective in many common skin disorders. The cetyl-alcohol-coal-tar distillate retains the therapeutic activity of crude coal-tar but is less likely to irritate and does not stain.

The effectiveness of all the active components is enhanced by the special oil-in-water emulsion base. 'Pragmatar' is convenient to use on both glabrous and hairy surfaces, and is therefore particularly useful in the general care and hygiene of the seborrhoeic scalp.

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ECZEMATOUS ERUPTIONS · PSORIASIS

'Pragmatar' ***the improved tar-sulphur-salicylic acid ointment. Issued in 1-oz. tubes.***

Formula : Cetyl-alcohol-coal-tar distillate 4% ; sulphur 3% ; Salicylic acid 3% ; in a washable base.

For cost to N.H.S., please see M. & J. list of costs dated January, 1955

SMITH KLINE & FRENCH INTERNATIONAL CO.
represented by Menley & James, Limited, Coldharbour Lane, London, S.E.5. Tel.: BRIxton 7851
FRP24 *'Pragmatar' is a registered trade mark*

RELEASING EXCESS FLUID

The need for a safe, potent oral drug for the rapid treatment of oedema has long been felt by doctors in hospital and general practice. This need is now adequately fulfilled by the introduction of DIAMOX Acetazoleamide, a new oral diuretic that is neither a mercurial nor xanthine derivative.

Based on a new concept—the induction of diuresis by inhibiting the enzyme carbonic anhydrase—DIAMOX is rapidly absorbed and excreted largely unchanged by the kidney. It is not a renal irritant, nor is it cumulative. After a single morning dose copious diuresis results. In most cases of left-sided heart failure, DIAMOX alone will maintain the patient oedema-free. Patients with severe right-sided heart failure, involving accumulations of fluid, may require paracentesis or mercurial injections to initiate response, after which dry weight can usually be maintained with DIAMOX alone.

Not a mercurial or xanthine derivative

Single dose induces diuretic response for 6-12 hours

Potent yet remarkably safe

Permits undisturbed sleep at night

Ideal for long-term therapy and for regular use at home

In scored tablets of 250 mg. Bottles of 25 and 100 tablets

Lederle **DIAMOX*** ACETAZOLEAMIDE Lederle

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THE NEW SAFE ORAL DIURETIC

LEDERLE LABORATORIES DIVISION

Cyanamid Products Ltd.

BUSH HOUSE, ALDWYCH, LONDON, W.C.2 TEMPLE BAR 5411

Transvasin

brings the esters of NICOTINIC ACID SALICYLIC ACID p-AMINOBENZOIC ACID

to the focal point of soft-tissue rheumatism

The esters in Transvasin, a new preparation developed by Hamol S.A., our Swiss associates, readily pass the skin barrier in therapeutic quantities and enable an effective concentration of the drugs to be built up where they are needed. Transvasin not only induces vasodilation of the skin with a superficial erythema, but also brings about a deep hyperaemia of the underlying tissues. It is non-irritant, and can be safely used on delicate skins. It is now being widely prescribed, with successful clinical results. Since a very small quantity is sufficient for each application, the cost of treatment is extremely low.

Salicylic acid tetrahydrofurfuryl-ester	14%
Nicotinic acid ethyl-ester	2%
Nicotinic acid n-hexyl-ester	2%
p-Aminobenzoic acid ethyl-ester	2%
Water-miscible cream base ad	100%

Transvasin is available in 1 oz. tubes, basic price 2/6 plus 7½d. P.T., and is not advertised to the public. Samples and literature will be gladly sent on application.

LLOYD-HAMOL LTD., 11 WATERLOO PLACE, LONDON, S.W.1. WHITEHALL 8654/5/6

Transvasin is the registered trade mark of Lloyd-Hamol Ltd.

The paroxysmal abdominal pain of infantile colic is a result of smooth muscle spasm of the gastro-intestinal tract. It is therefore most effectively relieved by the administration of 'Merbentyl' Syrup, the new form of the antispasmodic 'Merbentyl'. Strikingly free from the side effects usually associated with antispasmodic therapy, 'Merbentyl' Syrup is particularly suitable for administration to infants and children; especially as they enjoy its clean, clear taste.

'Merbentyl' Syrup is available in bottles of 4 and 20 Fl. oz.
'Merbentyl' Syrup with Phenobarbitone (each 5 c.c. containing 15 mg. Phenobarbitone) is also available, in the same sizes.

MERBENTYL
SYRUP
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Merrell

ALSO AVAILABLE

'Merbentyl' Tablets each containing 10 mg. Diethylaminocarbethoxybicyclohexyl hydrochloride.

'Merbentyl' with Phenobarbitone Tablets each containing 10 mg. Diethylaminocarbethoxybicyclohexyl hydrochloride and 15 mg. Phenobarbitone.

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SPECIFIC DESENSITISATION

is the key to ALLERGY TREATMENT

A remarkably high proportion of allergic conditions—especially those of complicated aetiology in which it is essential to track down the offending allergens—can be successfully treated with Bencard Desensitising Solutions.
The careful recording of the patient's case history, confirmed by the use of Bencard Skin Testing Solutions, enables the physician to prescribe accurately the correct desensitising solution. This method has been found to produce lasting benefit in 75% of those patients receiving only one course, and up to 95% including those who need a second or third course.

Desensitisation removes the cause of symptoms and is not merely palliative.

The Bencard Allergy Division has available a range of over 900 allergenic extracts for Skin Testing and the preparation of Specific Desensitising Solutions.

THE LATEST FILM ON ALLERGY

"ALLERGIC DISEASES IN MAN" a 16 mm. colour and sound film (800 ft.) is now available for showing to Medical audiences, It describes the latest conceptions of allergy and the Bencard Methods of diagnosis and treatment.

In many areas we can offer our own projector and operator.

SKIN TESTING OUTFITS

For the G.P.—The "A1—A13" outfit containing solutions of the most common allergens.

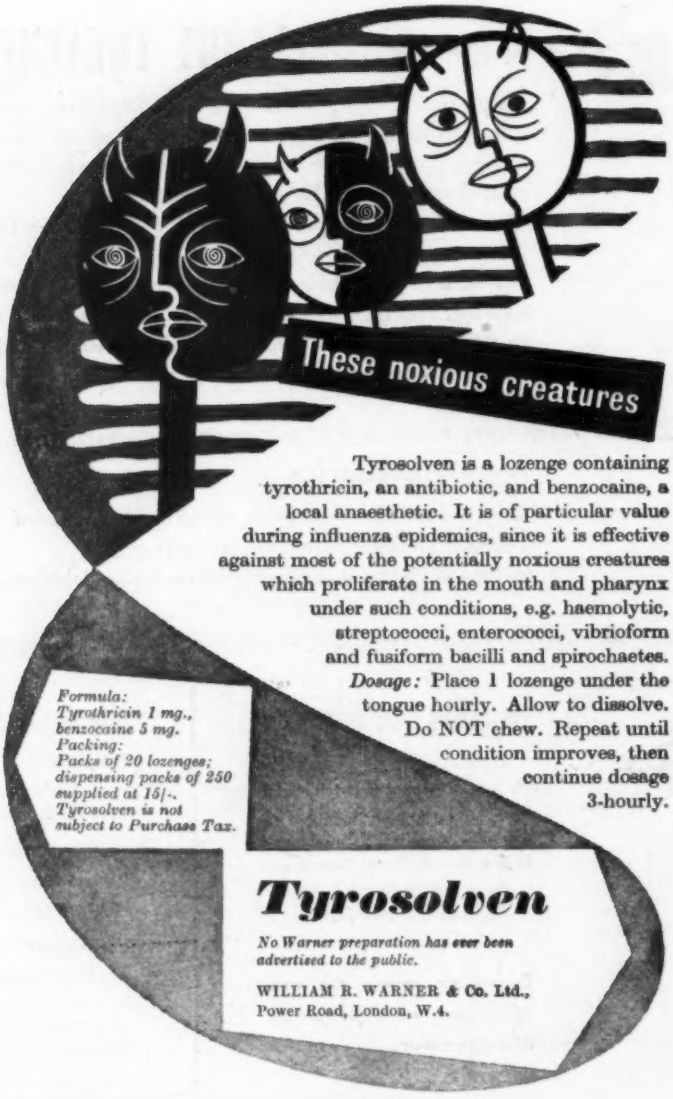
For the Consultant—A Standard Cabinet containing 72 solutions and necessary instruments.

For Clinics and Hospitals—The Hospital Skin Testing Cabinet, a comprehensive unit for routine skin testing of large numbers of patients.

FURTHER DETAILED INFORMATION WILL GLADLY BE SUPPLIED TO PHYSICIANS BY

THE BENCARD ALLERGY DIVISION

C. L. BENCARD LTD · PARK ROYAL · LONDON · N.W.10



Tyrosolven is a lozenge containing tyrothricin, an antibiotic, and benzocaine, a local anaesthetic. It is of particular value during influenza epidemics, since it is effective against most of the potentially noxious creatures which proliferate in the mouth and pharynx under such conditions, e.g. haemolytic, streptococci, enterococci, vibrioform and fusiform bacilli and spirochaetes.

Dosage: Place 1 lozenge under the tongue hourly. Allow to dissolve. Do NOT chew. Repeat until condition improves, then continue dosage 3-hourly.

Formula:
Tyrothricin 1 mg., benzocaine 5 mg.
Packing:
Packs of 20 lozenges; dispensing packs of 250 supplied at 15/-.
Tyrosolven is not subject to Purchase Tax.

Tyrosolven

No Warner preparation has ever been advertised to the public.

WILLIAM R. WARNER & Co. Ltd.,
Power Road, London, W.4.

'AVLOPROCIL' DRY

NOTEWORTHY FEATURES:

- ★ An aqueous suspension, ready for use, is very speedily obtained when water for injection is added.
- ★ The prepared suspension is easy to inject, causes the minimum of pain and there is no risk of needle blockage.
- ★ The presence of a bacteriostat ensures sterility.
- ★ The suspension shows no tendency to "clay" even after prolonged storage and only requires to be shaken before it is again ready for injection.
- ★ The suspension retains its full potency for at least one month after preparation when stored at temperatures not exceeding 25°C. (77°F.)

'Avloprocil' formulations have long been known to doctors for their high quality and reliability. **'Avloprocil' Dry** is the latest addition to the range. It presents the procaine salt of penicillin G as a stable, dispersible powder from which an aqueous injection can be readily prepared.

'Avloprocil' Dry can always be relied upon as an effective means of obtaining a sustained therapeutic level of penicillin in the blood.

A SUPERIOR PROCAINE PENICILLIN FOR INJECTION

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Available as: ***Single-dose*** *vials of 300,000 units*
Triple-dose *vials of 900,000 units*
Multi-dose *vials of 3,000,000 units*

Available under the National Health Service at Ministry of Health Drug Tariff prices.

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A subsidiary company of Imperial Chemical Industries Ltd.

Ph. 503

*N 15

for nasal decongestion

a new and unique formula

*Tyzanol**

brand of tetrahydrozoline hydrochloride
(2-(1,2,3,4,-tetrahydro-1-naphthyl) imidazoline hydrochloride)

Look to Tyzanol for nasal decongestion.
Provides nasal patency in minutes
for HOURS without taste or odour,
sting or rebound congestion

Tyzanol *is a chemically and clinically unique nasal decongestant. Among 203 patients given TYZANOL relief was rapid and prolonged, rebound congestion or other local or systemic side effects were not observed, and a gratifying experience was reported in 99.5 per cent of cases.*
New York State J. Med., in press

Tyzanol *is available in a combination pack —10 cc. of an 0.1% aqueous solution and a glass nasal dropper.*

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STANDARDISED Rauwolfia serpentina for uniform hypotensive activity

It has not been demonstrated that any single alkaloid has all the beneficial effects of Raudixin, the whole root of Rauwolfia serpentina, standardised by animal assays to ensure uniform activity.

Raudixin Tablets, 50 mg., bottles of 25, 100 and 1,000.

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A new cough specific

(Sodium 2:6 ditertiarybutylnaphthalene Monosulphonate)

suppresses cough with no undesirable side-effects

SODIUM 2:6 ditertiarybutylnaphthalene Monosulphonate (Becantyl), a product of original research, is a new agent that is specific in suppressing cough. It is unrelated to morphine and guaiacol.

BECANTYL does not cause constipation, anorexia, drowsiness or any undesirable side-effects; being devoid of side-effects BECANTYL may be prescribed for infants, children, and the aged.

Clinical experience supports the value of BECANTYL in suppressing all types of cough, and shows that it does not suppress expectoration.

BECANTYL may be used in the treatment of all types of cough. There are no contra-indications to its use.

BECANTYL is presented in 4 fluid ounce, 40 fluid ounce, and 80 fluid ounce bottles.

Samples and literature on request

BIBLIOGRAPHY

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Revue du Praticien 1954, No. 7

Becantyl

HORLICKS LTD. PHARMACEUTICAL DIVISION
SLOUGH, BUCKS.

BECANTYL *is the Registered Trade Mark of the Société des Laboratoires Labaz*

PENIDURAL

(Benzathine Penicillin)

ORAL SUSPENSION

"... the first oral preparation of penicillin which has in our experience been reliably absorbed in 100% of patients, irrespective of size and weight and using a standard dosage of 300,000 units ...."

British Medical Journal (1953), 11th April, pp. 805-6.

In this clinical trial, the 118 patients concerned were given PENIDURAL regardless of the times of meals or whether the stomach might be full or not ... conditions which greatly simplify administration in domiciliary practice.

Penidural Oral Suspension contains 300,000 units Benzathine Penicillin to each large teaspoonful (5 c.c.) and is supplied in bottles containing 60 c.c.

Oral Penidural is also available in tablets of 200,000 units.

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'Penidural' is a registered trade mark

JOHN WYETH & BROTHER LTD.,

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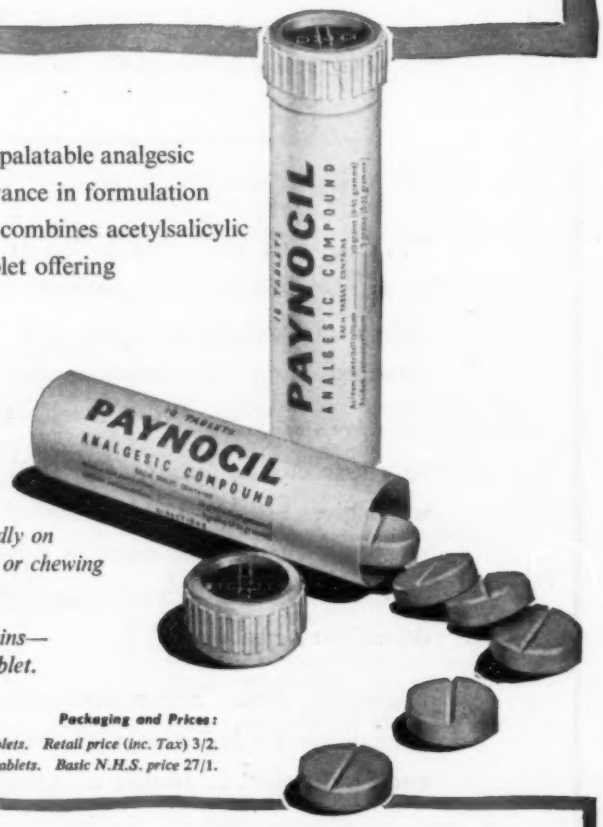
PAYNOCIL

OVERCOMES ASPIRIN IRRITATION



Paynocil is a new, non-irritant, palatable analgesic representing a considerable advance in formulation among products of its kind. It combines acetylsalicylic and amino-acetic acids in a tablet offering the following advantages:

- *It does not cause gastric irritation.*
- *It provides the most palatable and convenient form of analgesic medication.*
- *It disintegrates pleasantly and rapidly on the tongue; swallowing with water or chewing are unnecessary.*
- *An effective dose of aspirin (10 grains—0·65 gramme) is provided in one tablet.*

Packaging and Prices:
Tubes of 18 *tablets. Retail price (inc. Tax)* 3/2.
Dispensing packs of 240 *tablets. Basic N.H.S. price* 27/1.

LONG TERM, INTENSIVE USE

Because of its non-irritant properties Paynocil is ideal in the prolonged aspirin therapy necessary in rheumatoid arthritis.

SHORT TERM OR OCCASIONAL USE

It is equally suitable for the occasional analgesia required for headaches or neuralgia owing to its convenience and acceptability to all patients.

Formula: *each tablet contains:*
Acetylsalicylic acid . . . . . 10 grains (0·65 gramme)
Amino-acetic acid . . . . . 5 grains (0·32 gramme)

C. L. BENCARD LTD
Telephone: ELGar 6681

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the *new* diabetic has such advantages

To-day, the new diabetic has many facilities to enable him to lead and enjoy a normal life. The introduction of I.Z.S. (Insulin Zinc Suspension) A.B. has greatly simplified the treatment of the majority of cases, one injection being sufficient to control the blood-sugar level for 24 hours.

I.Z.S. offers the following advantages over other prolonged action insulin preparations :—

1. No protein or peptide material present other than insulin itself.
2. Rapid onset with prolonged action.
3. It meets the needs of a higher percentage of diabetics.

I.Z.S. (Insulin Zinc Suspension) A.B. is supplied in vials of 10 c.c. containing 40 or 80 units per c.c.

Insulin Zinc Suspension 'AB'

A|B

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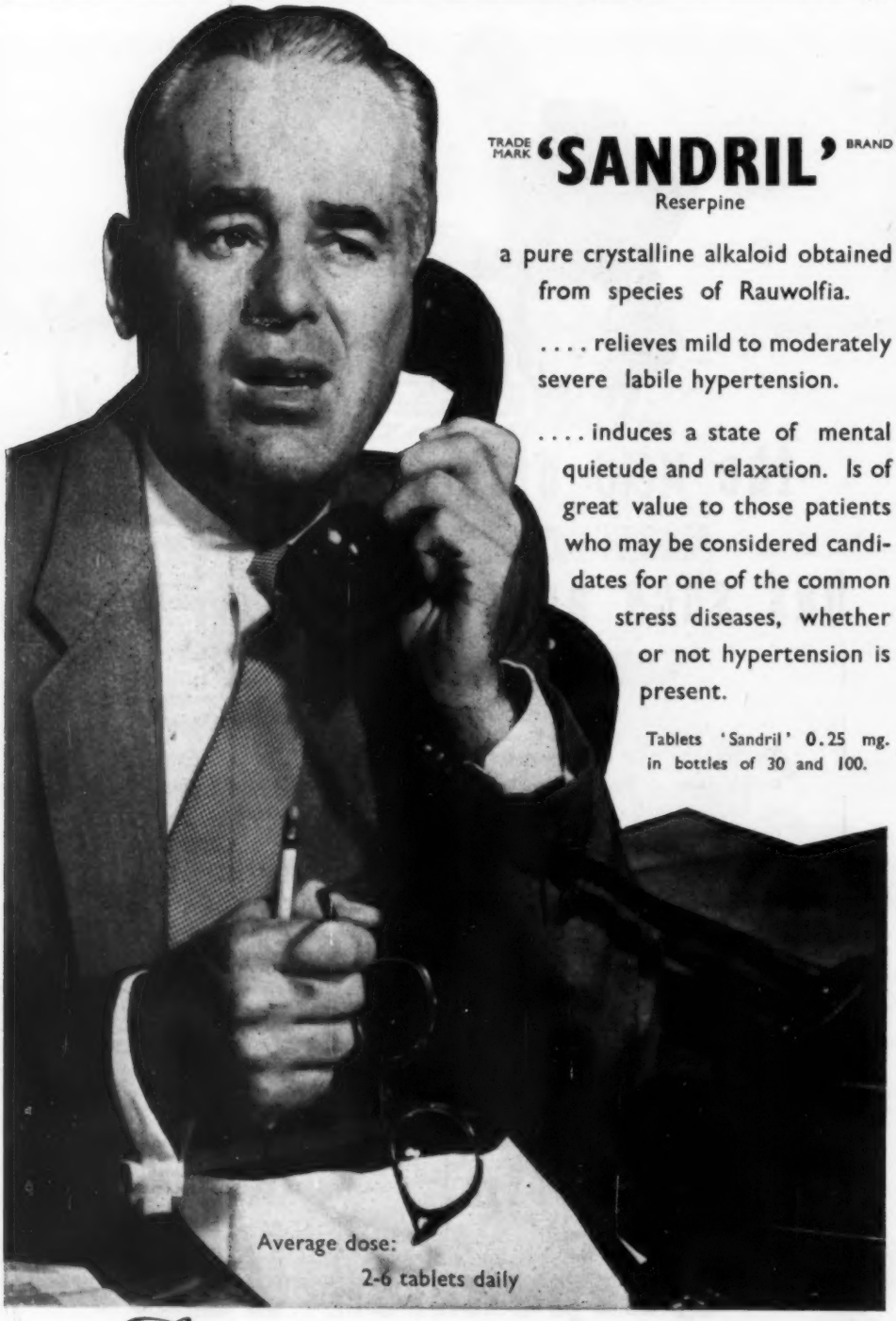

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Reserpine

a pure crystalline alkaloid obtained from species of Rauwolfia.

.... relieves mild to moderately severe labile hypertension.

.... induces a state of mental quietude and relaxation. Is of great value to those patients who may be considered candidates for one of the common stress diseases, whether or not hypertension is present.

Tablets 'Sandril' 0.25 mg. in bottles of 30 and 100.

Average dose:
2-6 tablets daily

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ELI LILLY AND COMPANY LIMITED
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Chlorpromazine is now being increasingly adopted in general practice for the management of the elderly sick or infirm patient. Published reports reveal that in the elderly, good results have been obtained in:

1 **Control of motor excitement and anxiety without clouding of consciousness or dulling of intellect**

2 **Control of progressively painful conditions such as inoperable cancer, either when given alone or concurrently with simple analgesics**

3 **Control of nausea and vomiting, and hiccoughing**

4 **Anaesthetic care of the poor-risk patient.**

Detailed information on 'Largactil' is available and will gladly be supplied on request.

SUPPLIES: Two strengths of tablets—10 mgm. and 25 mgm. Syrup containing 25 mgm. per 3·6 c.c. (approx. 1 teaspoonful). Solutions for injection—0·5% in 5 c.c. ampoules; 2·5% in 1 c.c. and 2 c.c. ampoules.

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trade mark
CHLORPROMAZINE HYDROCHLORIDE
MANUFACTURED BY
MAY & BAKER LTD

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Relief

from allergy . . .

BENADRYL, probably one of the most potent histamine antagonists, has proved to be of great value in the treatment of hay-fever, **urticaria,** vasomotor rhinitis, angio-neurotic oedema and, in the majority of cases, gives long looked-for relief in the skin infections and pruritic conditions associated with allergy. The Parke Davis range of products which include Benadryl provide for oral administration, topical and ophthalmic application and a solution for injection where, in acute allergic conditions, rapid action is required.

BENADRYL CAPSULES
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BENADRYL CREAM
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Cream and Lotion
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BENYLIN EXPECTORANT
BENADRYL EMPLETS
BENADRYL PARENTERAL
BENA-FEDRIN
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BENADRYL

A SUCCESSFUL ANTIHISTAMINE

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in more infections..

more effective

more conveniently

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Terramycin*

BRAND OF OXYTETRACYCLINE

TERRAMYCIN with its wider antibacterial range assures a greater chance of success in more infections than any other anti-infective agent.

There are tablets for adults, a palatable oral suspension for children, paediatric drops for infants and many other convenient forms for topical and parenteral use.

Normal temperatures in 24-48 hours are usual with TERRAMYCIN therapy.

TERRAMYCIN — administered promptly — frequently reduces the cost of health.

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(Biochemicals) Limited

WHEN, as with penicillin, the efficacy of a drug is universally accepted, its presentation and ease of administration then assume importance.

'Distaquaine' preparations are pre-eminently suitable for almost all those instances in which penicillin therapy is indicated.

'DISTAQUAINE' G brand

Procaine penicillin G for administration in aqueous suspension
vials of 300,000, 900,000 and 3,000,000 units.

'DISTAQUAINE' brand **FORTIFIED**

Procaine plus potassium penicillin G for administration in aqueous suspension
vials of 400,000, 1,200,000 and 4,000,000 units.

'DISTAQUAINE' brand **SUSPENSION**

'Distaquaine' G in ready-prepared aqueous suspension
vials of 10 ml. (300,000 units per ml.)

Advantages

* aqueous, containing neither oil nor wax
* easy to prepare and administer
* least possible pain on injection
* effective levels up to 24 hours following administration
* dry syringe unnecessary
* equipment easily cleaned after use

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owners of the trademark 'Distaquaine'

6/247

Butazolidin Regd.

Geigy

PRICE REDUCTION...

We are pleased to announce that prices of Butazolidin will be reduced from March 28th, 1955.

NEW PRICES TO PHARMACISTS

Tablets of 100 mg.	
Containers of 50 ..	9/-
Containers of 250 ..	41/4½
Containers of 1000 ..	164/7
Tablets of 200 mg.	
Containers of 20 ..	7/7
Containers of 50 ..	18/-
Containers of 100 ..	34/10
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Ampoules of 1000 mg. in 5 ml.	
Boxes of 5	8/5
Boxes of 25	38/2
Boxes of 50	72/-
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Rhodes, Middleton, MANCHESTER.

PH. 71

Achromycin*

TETRACYCLINE

today's true broad-spectrum antibiotic

greater striking power with fewer side effects

More rapidly absorbed.

Quicker diffusion in body tissues.

Fewer side effects.

Greater stability.

On all counts—effectiveness, range of activity, freedom from side-effects—ACHROMYCIN tetracycline has set new standards in broad-spectrum antibiotics. No other broad-spectrum antibiotic is so stable, so soluble . . . none can match the high blood concentrations and prolonged antibacterial levels achieved with ACHROMYCIN. The antibacterial range of ACHROMYCIN is equally outstanding—indeed, every organism sensitive to broad-spectrum antibiotics responds equally well to ACHROMYCIN. Yet, extensive clinical trials have shown this drug to be almost completely free from undesirable side-effects.

ACHROMYCIN TETRACYCLINE a true broad-spectrum antibiotic

Tablets 50 mg. Vials of 25 and 100; 250 mg. Vials of 16, and bottles of 100.
Capsules 50 mg.—Vials of 25 and 100. 250 mg.—Vials of 16, bottles of 100.
Intramuscular Vials of 100 mg.
Intravenous Vials of 250 mg. and 500 mg.
Oral Suspension Cherry flavoured—Bottles of 1 oz.
Pediatric Drops Cherry flavoured—Bottles of 10 cc.
Spersoids† Dispersible powder—Jars of 36 Gm. and 75 Gm.

* Regd. Trade-Mark
† Trade-Mark

Achromycin is at present only available to hospitals.

Lederle

LEDERLE LABORATORIES DIVISION
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REDUCTION OF HYPERMOTILITY

'Lergine' brand Tricyclamol Chloride, a new anti-cholinergic agent, markedly reduces gastro-intestinal motility and spasm, and diminishes gastric, pancreatic and intestinal secretions.

As an adjunct to the dietary treatment of peptic ulcer, 'Lergine' provides prompt relief of spasm and pain. In cases requiring added sedation 'Lergine' brand Compound, which contains tricyclamol and phenobarbitone, is advised.

'Lergine' has proved highly effective in relieving the pain and constipation associated with spastic or "irritable" colon, and is valuable in treating pyloro-spasm, ulcerative colitis, regional ileitis and some types of diarrhoea, for example that associated with pancreatic insufficiency.

'Lergine' and 'Lergine' Compound are each issued in bottles of 100 and 500, the former at prices of 17/6d. and 80/-, and the latter at 19/6d. and 85/-, each subject to the usual discount.

'LERGINE' TRADE MARK

'LERGINE' brand Tricyclamol Chloride, 50 mgm. compressed products.

'LERGINE' COMPOUND. Compressed products containing 50mgm. tricyclamol chloride and 16mgm. (gr.¼) phenobarbitone.

BURROUGHS WELLCOME & CO. *(The Wellcome Foundation Ltd.)* **LONDON**

29

A new treatment for threadworm and roundworm infestation

'Entacyl' is a particularly effective anthelmintic. Its action is rapid. Its taste is pleasant. Its administration is not accompanied by nausea or other side effects even in very young children. Complete eradication is obtainable without the use of an enema.

DOSAGE: *1 tablet per year of life per day up to the age of six years. Over six years of age 2 tablets three times a day. This dosage should be administered for one week.*

Pads of instruction leaflets intended to be handed to patients undergoing treatment with Entacyl for threadworm infestation are available on request.

Tablets containing Piperazine Adipate 300 *mg.*
(BRIT. PAT. APPN. NO. 29133/53)

'ENTACYL' TRADE MARK

BASIC N.H.S. PRICES: Bottles of 25 at 3/- and 100 at 10/-

Fully descriptive literature and specimen packings are available on request.

THE BRITISH DRUG HOUSES LTD. (Medical Department) LONDON N.I

BDH/E/541

ASSESSMENT OF BLOOD-LOSS IN CIVILIAN TRAUMA

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CECIL T. G. FLEAR
B.Sc., M.B. Birm.
HOUSE-SURGEON, BIRMINGHAM ACCIDENT HOSPITAL; MEMBER OF M.R.C. INDUSTRIAL INJURIES AND BURNS RESEARCH UNIT

THE effective use of efficiently cross-matched blood in the emergency treatment of trauma is limited by difficulty in assessing the amount of blood lost and by lack of clarity on the optimal extent and timing of its replacement. Blood-transfusion can be used in trauma not only to control overt patterns of clinical "shock" but also to prevent degrees of oligæmia and anæmia which may contribute to the "illness of trauma" both in the acute phase and during the ensuing weeks. We attempt here to define the degree of blood-loss in certain civilian injuries.

During the 1939–45 war many workers—e.g., Grant and Reeve (1951), Emerson and Ebert (1945), and Noble and Gregersen (1946)—found greater blood-loss than had previously been recognised, and recommended the transfusion of larger quantities of blood. They tried to correlate blood volume with blood-loss from the wound. Though blood-loss to the exterior can rarely be measured accurately, it appeared that total blood-loss from war wounds could be roughly gauged by consideration of the nature and extent of local injuries, at least when they were confined to the extremities.

Noble and Gregersen (1946) state that in skeletal trauma:

"the total amount of blood-loss will in general depend on the extent of muscle contusion, upon the number of fractures, and upon their relation to blood-vessels."

Their estimations of blood volume showed that a single major fracture was likely to be associated with a reduction of blood volume of about 20%, two major fractures with a reduction of 20–40%, and three or more such fractures with a reduction of more than 40%.

Grant and Reeve (1951) found the volume of damaged tissue to be a valuable index of blood-loss. They took as a unit of volume the patient's hand—the closed fist for deep wounds, and the open hand for surface wounds—and divided wounds into four categories:

(1) *Small wounds*, with tissue damage of less than 1 hand: blood-loss less than 10%, rarely more than 20%.

(2) *Moderate wounds*, with tissue damage of 1 or more but less than 3 hands: blood-loss 20–40%.

(3) *Large wounds*, with tissue damage of more than 3 but less than 5 hands: blood-loss about 40%.

(4) *Very large wounds*, with tissue damage of 5 hands or more: blood-loss about 50% or more.

These workers recognise the crudeness of their approach but state that they

"came to rely on it more and more, and that when we dealt with abdominal injuries, where this was not available, our clinical assessments of blood-loss were more often at fault. Wound size is of particular value as a sign, because it is not, like blood-pressure and other circulatory phenomena, liable to be affected by other factors."

One of us (Clarke 1952) attempted to assess blood-loss in civilian injuries from hæmoglobin levels during the ensuing two weeks, with occasional plasma-volume studies, and was convinced that blood was lost in civilian injuries, even in closed fractures, in amounts comparable to that lost from the more obviously damaging wounds of war.

We report here studies of blood-loss in closed and open injuries, emphasising the relevance of limb swelling. In contrast to earlier workers we have deliberately delayed blood-volume studies until at least twenty-four hours after injury. We have used the red-cell volume at this time as the index of whole-blood credit or deficit. Hb levels during the following two weeks provide further evidence of this whole-blood credit or deficit. These results, combined with the knowledge of the volume of blood transfused, provide a guide to total blood-loss.

Methods

RED-CELL VOLUME

Red-cell volume, plasma volume, and venous hæmatocrit were estimated in 22 cases from one to four days after injury. We have assumed that any changes in the red-cell volume during the first four days after injury are likely to be due to two main factors: blood-loss from injury, and blood replaced by transfusion. The red-cell volume during this period is probably not greatly affected by new formation of red cells (Topley et al. 1955). In contrast the plasma volume can change by hæmodilution and thereby alter the Hb level, &c., in the peripheral blood. Primary consideration was therefore given to the red-cell volume rather than to whole-blood volume.

We express red-cell volume in terms of whole blood so that it can be correlated with measurements of blood transfused, blood-loss to the outside, and limb swelling which may be due to blood-loss. We have assumed that blood lost from the site of injury had a hæmatocrit of 40%, and that each bottle of blood transfused (540 ml. including anticoagulant) contains about 440 ml. of donor blood, of which about 400 ml. reaches the patient. One bottle therefore provides 0·4 litre. Thus the whole-blood loss in litres at the time of a red-cell volume estimate from one to four days after injury is

$$\frac{\text{(predicted normal red-cell volume in litres—1–4 day red-cell volume in litres)}}{0{\cdot}4} + (\text{bottles of blood transfused} \times 0{\cdot}4).$$

The technique of estimating red-cell volume was, except where otherwise stated, the radioactive ^{32}P red-cell volume method of Reeve and Veall (1949) with Chaplin's (1954) modification. In a few instances we derived an estimate of red-cell volume from the Evans-blue plasma volume and venous hæmatocrit.

The predicted normal red-cell volume was usually calculated from both the follow-up weight and the ^{32}P red-cell volume, occasionally from pre-injury weight or follow-up height. For males we have allowed 30 ml. red-cell volume per kg. of body-weight. For females, and whenever height has been used, we have used the data of Gibson and Evans (1937), adding a correction for body/venous hæmatocrit ratio.

The impossibility of knowing the pretraumatic blood volume reduces the accuracy of the estimated red-cell volume deficit. In more serious injuries the blood volume may not return to normal even after prolonged convalescence. In injuries with permanent disability and loss of muscular tone it may never return to pre-accident level—e.g., case 35.

Usually the ^{32}P red-cell technique from one to four days after injury can reasonably be used for analysis of blood-loss. The red-cell volume derived from the Evans-blue and venous hæmatocrit is often of the same order of accuracy though occasionally misleading (Topley et al. 1955).

HÆMOGLOBIN

From admission onwards repeated tests were made on the peripheral blood by the oxyhæmoglobin method. The lowest Hb level during this period is regarded as further evidence of whole-blood deficit or credit at the end of emergency treatment. For example, in a series

of relatively severe injuries all the patients whose Hb level fell more than 30% below normal had a red-cell volume deficit of at least 20% below normal by the second or third day, whereas all the patients who never became anæmic had a red-cell volume credit at the end of emergency treatment.

LIMB SWELLING

We measured the increased size of injured limbs by comparison between the injured and normal. Two methods were used, the first involving fluid displacement, and the second serial circumferential measurements. Both are suitable for closed fractures; the second can also be used for open fractures.

Fluid Displacement Method

The injured limb is immersed in a 'Perspex' tank so that a line marked circumferentially on the limb at a known distance from a bony landmark corresponds to the level of water in the tank. This is next marked off on the tank. The injured limb is removed, and the normal limb is placed in the tank. With this limb immersed to a mark at a similar level, water is added so that the level comes up to the mark on the tank. The amount of water added equals the difference in volume between the two limbs.

The accuracy of this method was tested in 20 normal adult males. At a point 4 inches below the tibial plateau there was a mean difference of 19 ml. between the right and left legs (S.D. $\pm$ 25·9 ml.); at a point 9 inches below the tibial plateau the mean difference was 11 ml. (S.D. $\pm$ 21·1 ml.). For practical purposes the method is probably accurate to within 50–75 ml. in any individual case.

Circumferential Measurement

Measurement of swelling in this way (Cotterill 1951) involves circumferential measurements over a length of the injured and normal limbs, at 2-cm. intervals, starting from a fixed bony point. With this information it is possible to calculate the difference between the summated volumes of a series of imaginary cylinders. Since the limb is not circular on cross-section, this approach underestimates the actual volume; and, since the swollen limb is more nearly cylindrical, it underestimates the difference still more. Nevertheless it provides a guide of considerable use for this purpose. Clearly it is unreliable in the presence of gross shortening from a fracture with overlap, and cannot be applied until this has been corrected.

The accuracy of this method using an ordinary tape-measure was checked by repeated measurements on six normal people. The mean difference between the two limbs was 154 ml. (S. D. $\pm$ 76·6 ml.) for the thigh and 66 ml. (S. D. $\pm$ 36·6 ml.) for the leg. For practical purposes it is probably accurate within 250 ml. for the thigh and 150 ml. for the leg.

The limb swelling in one patient was measured by fluid displacement and circumferential measurement methods, and substantial agreement was found.

SIGNIFICANCE OF LIMB SWELLING

Numerous workers (Blalock 1930, Parsons and Phemister 1930, Freedlander and Lenhart 1932, O'Shaughnessy and Slome 1935, Slome and O'Shaughnessy 1938, Ashworth et al. 1944, Nickerson 1945, Phemister and Laestar 1945) have measured the volume of swelling associated with experimental injuries and have tried to correlate it with the general reactions of the organism and with blood-volume changes. We have been unable to find any similar attempt in accidental injuries of limbs in man.

We are concerned not only with the volume of swelling but also with its composition. In theory such swelling could be due to whole blood, exudation of plasma, or increased circulating fluid in the vessels. Other extracellular or intracellular swelling is less likely. The over-all composition of the swelling probably changes with the passage of time and varies with the species and the nature of the injury.

In animals such swellings have been variously estimated to contain 25–100% of whole blood. The common civilian injuries of man are associated with tearing and torsion of blood-vessels, opening up tissue space rather than inflicting direct violence to the tissues.

We suggest that in the acute stage of human injury—i.e., within the first 6–12 hours—the swelling consists largely of whole blood. Our impressions are supported by the following additional considerations:

(1) At operation on closed fractures during this period large amounts of blood are found in the region of the swelling.

(2) At operation during this same period tissues are normal in texture by contrast with their appearance when exposed to surgery at a later stage. Œdema or exudate is rarely seen.

(3) In major limb injuries due to acute violence and not resulting from prolonged pressure there has been found no evidence of hæmoconcentration suggesting differential loss of plasma from the circulation (Chute et al. 1945, Emerson and Ebert 1945, Grant and Reeve 1951).

(4) Many patients with moderate swelling at the acute stage develop widespread discoloration later.

(5) The amount of swelling in the closed injuries which we have investigated corresponds in amount approximately to the primary loss of whole blood indicated by red-cell volume studies.

We are convinced on clinical grounds that the size of early local swelling is a valuable guide to blood-loss and to the contribution of local damage to the systemic disturbance. Further observations are required in man, including studies on red-cell and plasma-volume and on the contribution of blood to limb swelling.

TABLE I—CLOSED INJURIES: BLOOD-LOSS CALCULATED FROM RED-CELL VOLUME

Case no.	Age (yr.)	Site of fracture	Weight or height	Predicted normal blood volume (litres)	Day of R.C.V.	A: whole-blood deficit (litres) calculated from predicted normal R.C.V. by follow-up		Lowest Hb level on day 4–14 (g. per 100 ml.)	B: blood-transfusion (litres)	A + B: whole-blood loss (litres)		
						(a) weight or height	(b) R.C.V. by ^{32}P			(a)	(b)	Mean
1	20	Shaft of femur	64 kg.	4·8	4	1·6	0·9	11·7	0	1·6	0·9	1·2
2	65	Shaft of femur	65 kg.	4·9	1	1·8	0·9	10·2T	0	1·8	0·9	1·3
3	29	Trochanter of femur; tibia and fibula	..	4·3[1]	3	..	2·0	8·0T	0	..	2·0	..
4	34	Shaft of femur	63 kg.	4·7	1	−1·3	−0·9	14·7	2·0	0·7	1·1	0·9
5	43	Shaft of femur	77 kg.	5·8	1	0·1	−0·8	14·0	0·8	0·9	0·0	0·4
6	25	Shaft of femur; ankle; 4 and 5 metacarpals	63 kg.	4·7	1	0·2	1·5	13·8	0·8	1·0	2·3	1·6
7	62	Trochanter of femur; clavicle; 1st rib	73 kg.[2]	4·0	1	0·6	0·0	12·6	1·6	2·2	1·6	1·9
8	63	Ilium	59 kg.	4·4	1	−0·4	−0·7	13·4	1·2	0·8	0·5	0·6
9	55	Shaft of femur	171 cm.[3]	5·0	1	0·9	..	14·7	0·8	1·7	..	..
10	15	Lower femur	49 kg.[4]	3·7	1	0·9	..	..	0	0·9	..	..

R.C.V., red-cell volume. ^{32}P, radioactive-phosphorus technique. T, Hb level before blood-transfusion for anæmia.

* Predicted normal R.C.V. for males = follow-up weight (kg.) × 30 (ml.), and blood volume = weight (kg.) × 75 (ml.) with the following exceptions: 1, based on follow-up ^{32}P R.C.V. + plasma volume. 2, because of gross weight change, pre-accident weight was used, and because female, figures of Gibson and Evans (1937) were used. 3, because height, not weight, was used, figures of Gibson and Evans (1937) were used. 4, because of gross weight change, pre-accident weight was used.

BLOOD-LOSS FROM WOUNDS

Blood-loss from open wounds cannot be measured before the patient comes under medical care. Occasionally we have been able to examine the site of the accident and to gauge the extent of primary bleeding. Usually we receive a large proportion of serious accidents within 15–30 minutes of injury and have the impression that early bleeding before arrival at hospital only makes a decisive contribution to total blood-loss in a small percentage of cases. Sometimes we can derive a crude estimate from the staining of clothes or of the stretcher on arrival at hospital.

Once the patient is in hospital, it is possible to encase the wound area in a 'Polythene' bag fixed to the limb above and below the wound and to collect blood shed between admission and surgery. At operation for closed or open injuries blood-loss can be determined by weighing the swabs (Baronofsky et al. 1946). Such observations have been made on some of the patients reported here. Additional estimates were based on the degree of mess on the floor; staining of towels, gowns, &c.; or the rate of blood drip from the wound.

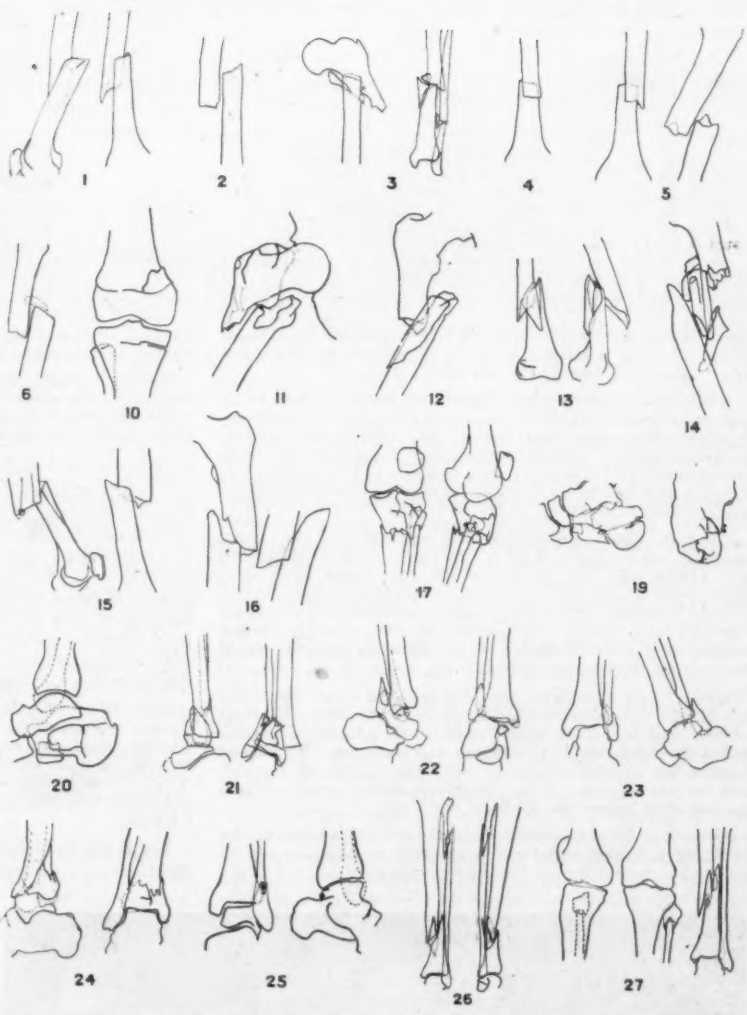

Fig. 1—Tracings of radiographs showing injuries: numerals refer to cases in text and tables.

Results

CLOSED INJURIES

The investigation of closed injuries is uncomplicated by blood-loss to the outside. We have made observations on patients not requiring surgery and without clinical signs of "shock." Many of them would normally not be considered to require transfusion. Some have received blood-transfusions designed to modify the "illness of trauma," in amounts varied so that the effects of such variation could be studied.

The evidence of *blood-loss from red-cell volume* studies in closed fractures is summarised in table I, in which A shows the whole-blood deficit or credit—i.e., the difference between the measured red-cell volume (day 1–4) and the "predicted normal" red-cell volume derived (*a*) from follow-up weight, and (*b*) from follow-up ^{32}P red-cell volume. The lowest Hb level recorded during the ensuing two weeks is included as a further guide to the whole-blood credit or deficit. B shows the amount of blood transfused. Whole-blood loss (A+B) is calculated separately from follow-up weight and ^{32}P red-cell volume. These results have been arbitrarily averaged.

Case 1.—An airman, aged 20, fractured the shaft of his femur (fig. 1). At hospital half an hour later his skin was warm and pink and his pulse and blood-pressure were normal. The fracture was treated by manipulation and skeletal traction under general anæsthesia. The primary swelling of the limb was relatively small (table II) and was measured as 0·4 litre. The thigh continued to swell for two days. No further interference with the fracture was needed. Total blood-loss calculated from red-cell volume on the fourth day after injury was 1·2 litres.

Case 2.—A baker's roundsman, aged 65, was knocked off his cart, fracturing his left femur (fig. 1) and pubic bone. On admission his colour and skin-temperature were normal, pulse-rate 80, and B.P. 120/70 mm. Hg. Under general anæsthesia the femur was reduced and fixed by skeletal traction. Local swelling was estimated to be at least 1·0 litre, with additional extravasation from the pubic fracture, suggesting total blood-loss of about 1·5 litres. The red-cell volume deficit on the day after injury was 1·3 litres.

Case 3.—A man, aged 29, knocked down by a car, sustained a mild head injury, lacerated scalp, closed fracture of the left tibia and fibula, and comminuted fracture of the upper right femur (fig. 1). He was a little pale, B.P. 120/90 mm. Hg, pulse-rate 80. Under general anæsthesia skeletal traction was applied to the right leg, and the fracture of the left leg was manipulated and put in plaster; the lacerated scalp was sutured. Blood-loss from the scalp was less than 0·2 litre. It was estimated that he had lost 0·75 litre into the left leg and 1·0 litre into the right thigh. He was not transfused. Blood-loss from red-cell volume on 3rd day was 2·0 litres.

Case 4.—A miner, aged 34, injured by a fall of coal, reached hospital six hours later with a fractured femur (fig. 1), which

TABLE II—CLOSED INJURIES: LIMB-VOLUME DIFFERENCES BY SERIAL CIRCUMFERENTIAL MEASUREMENTS

Case no.	Age (yr.)	Time after injury (hr.)	Injury	Distal point from which measurements were taken	Distance over which measured (cm.)	Difference in volume (litres)
11	25	6	Subtrochanteric fracture of femur	Tibial plateau	42	1·3
12	48	7½	Fractured upper shaft of femur	Tibial plateau	38	1·6
13	46	2½	Fractured lower shaft of femur	Tibial plateau	36	1·4
14	21	2½	Comminuted fracture of shaft of femur	Tibial plateau	40	2·2
15	70	5½	Fractured mid-shaft of femur	Tibial plateau	40	1·2
16	55	3	Fractured upper shaft of femur	Tibial plateau	40	0·4
1	20	3	Fractured lower shaft of femur	Tibial plateau	44	0·4
10	15	14	Fractured lower femur	Lateral malleolus	40	1·2
17	66	7	Comminuted fracture of tibia and fibula into knee-joint	Lateral malleolus	44	1·3
18	54	7 days	Ruptured right biceps	Radial styloid process	26	1·0

was reduced by skeletal traction under general anæsthesia. Given 5 bottles of blood (2·0 litres). Red-cell volume showed blood-loss of 0·9 litre by the day after injury.

Case 5.—A boiler-maker, aged 43, involved in a road accident, reached hospital four hours later. A transverse fracture of a femur was treated by skeletal traction and reduction under general anæsthesia. Local swelling was estimated to be 1·0 litre. Given 2 bottles of blood (0·8 litre). Total blood-loss from red-cell volume on day after injury was 0·4 litre.

Case 6.—An engineer, aged 25, was involved in a road accident. One and a half hours later he was pale, with B.P. 145/95 mm. Hg, pulse-rate 106, and fractures of right femur (fig. 1), lateral malleolus, and metacarpals. Under general anæsthesia fractured femur was reduced by skeletal traction, and plaster was applied to the ankle. Given 2 bottles of blood (0·8 litre). Blood-loss from red-cell volume on the day after injury was 1·6 litres.

Case 7.—A housewife, aged 62, knocked down by a car, sustained a comminuted fracture of the upper femur, bruising of both legs, and a fractured clavicle. On admission she was pale and cold, with B.P. 110/70 mm. Hg, pulse-rate 80. Femur treated by skeletal traction. Swelling at site of fracture was about 1·0 litre. Total blood-loss from red-cell volume on day after injury was 1·9 litres.

Case 8.—An engineering worker, aged 63, struck in the back by a girder, sustained a fracture of iliac bone with moderate hæmatoma. Swelling estimated at 0·8 litre. Given 3 bottles of blood (1·2 litre). Blood-loss from red-cell volume on day after injury 0·6 litre.

Case 9.—A man, aged 55, knocked off a bicycle, had a spiral fracture of the shaft of a femur, treated by traction. Given a transfusion of 2 bottles of blood (0·8 litre). Blood-loss from red-cell volume on day after injury 1·7 litres.

Differences in Limb Volumes

These differences, estimated by serial circumferential measurements in 10 patients with closed injuries, are given in table II. Associated injuries are ignored for this purpose. The table gives the timing of the measurements and the distances over which they were made. Tracings of radiographs of bony injuries are shown in fig. 1. Case 18, not associated with any fracture, is shown in fig. 2J. Case 10 is of special interest because the swelling was measured with a high degree of accuracy in a limb with neither displacement nor instability of the fracture site.

Case 10.—A boy, aged 15, knocked off a bicycle, sustained an undisplaced fracture of the lower end of a femur (fig. 1). The swelling was out of all proportion to the bony injury. The fracture was treated by skin traction and healed uneventfully. Limb swelling was found to be 1·2 litres. Blood-loss determined by red-cell volume on the day after injury was 0·9 litre.

Limb-volume differences estimated by the fluid-displacement technique in 9 relatively minor injuries are shown in table III. Tracings of the radiographs are shown in fig 1 and a photograph of case 19 in fig. 2H.

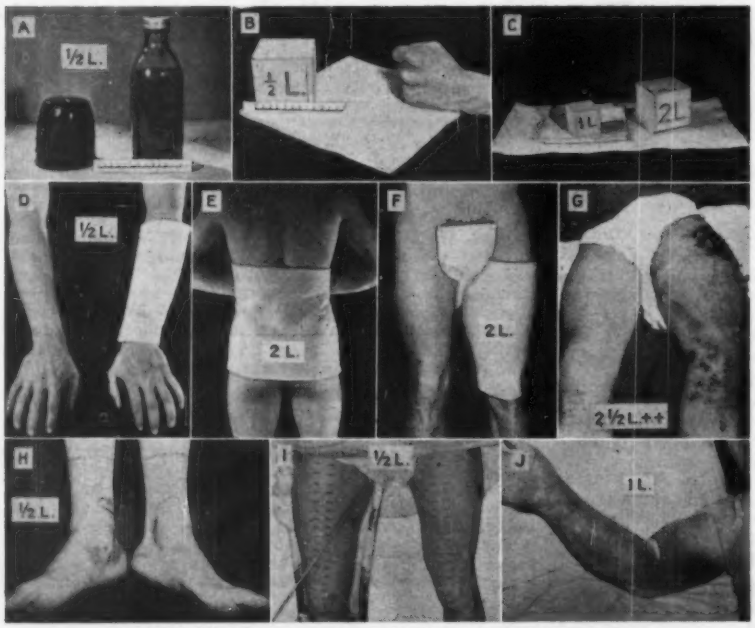

Fig. 2—Swelling of soft tissues from blood-loss: A, B, C, &c., see text.

Hæmoglobin Levels

Blood-loss was estimated from the red-cell volume in relatively few patients with closed fractures of the femur. Of 9 such patients 3 showed a fall of Hb level to less than 12·5 g. per 100 ml. during the ensuing two weeks. The estimated whole-blood deficit in these cases (cases 1, 2, and 3) was 1·2, 1·3, and 2·0 litres. None had received a blood-transfusion. The fall in Hb level often reflects the whole-blood deficit at the end of emergency treatment.

The Hb level was determined repeatedly in 64 of 75 consecutive cases of closed fracture of the femur treated by one team (excluding patients in the present series and patients with fractures confined to the femoral neck, trochanters, and condyles). Of the 64 patients 51 received no primary transfusion, and 31 of these showed a fall of Hb level to below 12·5 g. per 100 ml

during the two weeks after injury, and 15 of the 31 to below 11·0 g. per 100 ml. Only 4 showed no fall below 14·0 g. per 100 ml. These observations show the frequency of mild anæmia following such fractures, and suggest that the estimates of blood-loss associated with closed fractures of the femur reported here are representative of the general run of injuries of this type.

Photography and Reconstruction of Swelling

The data given above have confirmed previous impressions that a valuable guide to blood-loss is the volume of swelling at the site of injury. We illustrate our approach by photography and by reconstruction of volumes in various clinically relevant forms (fig. 2).

Fig. 2A shows a bottle of blood beside half a litre of jelly, the volume of the contents of the bottle; B shows a solid cube and a piece of surgical felt (the volume of each being that of half a litre of blood) alongside a fist, used as a rough guide by Grant and Reeve (1951); D shows a pair of normal forearms, one of which is wrapped in a half-litre of felt, illustrating a degree of swelling not infrequently observed in fractures of the forearm; H (case 19, table III) shows half a litre of swelling from a fracture of the os calcis; and I shows half a litre of swelling from a fracture of the upper end of the femur (case 11, table II).

Fig. 2C shows a cube and a piece of surgical felt, each equal in volume to 2 litres of blood, compared with the half-litre cube and felt. E shows 2 litres of felt wrapped round the back, representing the sort of swelling that can accompany fracture of the pelvis. Much larger swellings have been seen in patients with severe injuries to the trunk. F shows the 2 litres of felt round the thigh, representing a degree of swelling not infrequently seen in fractures of the femur. G (case 34, table IV) shows gross swelling of the thigh associated with fracture of the shaft of the femur and amounting to more than 2·5 litres. J (case 18, table II) shows 1 litre of swelling in the arm after rupture of the biceps muscle.

Summary

In summary the swelling associated with fractures of foot and ankle ranged from 0·15 to 0·50 litre; with fractures of the tibia and fibula from 0·25 to 1·30 litres; and with fractures of the shaft of the femur from 0·40 to 2·20 litres. Red-cell volume showed whole-blood loss in similar fractures of the shaft of the femur to range from 0·40 to 1·70 litres.

TABLE III—CLOSED FRACTURES: LIMB-VOLUME DIFFERENCES BY FLUID DISPLACEMENT

Case no.	Age (yr.)	Time after injury (hr.)	Site of fracture	Sites of measurement below tibial plateau (inches)	Volume differences (litre
19	45	21	Os calcis	9	0·50
20	70	2	Os calcis	13	0·30
21	14	4½	Lower tibial epiphysis	9	0·30
22	46	5	Ankle	4	0·15
23	48	7½	Ankle	9	0·30
24	49	3	Lower tibia	9	0·25
25	62	1	Ankle	9	0·25
26	55	3	Tibia and fibula	1	0·45
27	48	22	Tibia and fibula	4	0·40

OPEN INJURIES

In open wounds and fractures measurement of blood-loss is complicated by bleeding to the outside. The extent of damage is often greater than in closed injuries, and its assessment is more often complicated by further loss at operation, associated with further trauma.

The patients described below are typical of many major accidents. The evidence for blood-loss was obtained under conditions which allow early admission and early transfusion. The degree of blood-transfusion was greater than is common practice. With smaller transfusions it would be hazardous to carry out many primary procedures which can now be completed with safety. Blood-transfusion was deliberately withheld from a few patients whose injuries would normally not be considered to require transfusion.

In 12 male patients, aged 16–60, we attempted to assess the relative contribution of limb swelling, blood-loss to the exterior, and further unexplained disappearance of whole blood. With one exception (case 29) they claimed to be perfectly fit before the accident.

Patients were selected for inclusion in this series because (1) it was considered that they were likely to survive; (2) veins were available, and the patient was sufficiently coöperative to enable the blood volume to be studied without interference with treatment or the creation of anxiety; (3) the injuries were considered to be of sufficient severity for blood-loss to be large enough to be measured by our methods; and (4) they were free from

TABLE IV—OPEN INJURIES: BLOOD-LOSS CALCULATED FROM RED-CELL VOLUME COMPARED WITH CLINICAL ESTIMATE

Case no.	Age (yr.)	Site of open fracture	Visible damage to soft parts	Associated closed injuries	Follow-up		Day of R.C.V.	A: whole-blood deficit (litres) calculated from predicted normal* by follow-up		Lowest Hb level on day 4–14 (g. per 100 ml.)	B: blood transfusion (litres)	A + B whole-blood loss (litres)			C: clinical estimate		(A + B) − C: remaining deficiency (litres)
					Weight (kg.)	* Blood volume (litres)		* (a) weight	(b) R.C.V. by ^{32}P			(a)	(b)	Mean	Blood-loss to outside (litres)	Limb swelling (litres)	
28	43	Tibia and fibula	+	..	59	4·4	1	1·0	0·1	12·3T	0	1·0	0·1	0·5	0·1	0·5	0
29	49	Femur	+	..	58	4·1	2	1·9	3·1	8·7	0	1·9	3·1	2·5	0·5	1·1	0·9
30	35	Femur	+ +	Clavicle	73	5·5	2	1·2	1·4	11·9T	0	1·2	1·4	1·3	0·3	1·0	0
31	30	Tibia and fibula	+	Dislocated hip	70	5·2	2	2·5	2·0	10·3	0	2·5	2·0	2·2	0·4	1·0†	0·8
32	60	Femur	+ +	..	66	4·9	2	0·6	1·0	9·9	2·4	3·0	3·4	3·2	1·0	1·5	0·7
33	16	Tibia and fibula	+ + +	Wrist	57	4·3	1	−0·8	−0·3	13·7T	3·6	2·8	3·3	3·0	2·0	0·7	0·3
14	21	Tibia and fibula	+ + + +	Femur	43	3·2	2	0·5	−0·1	10·0	2·8	3·3	2·7	3·0	0·2	2·5†	0·3
12	48	Tibia and fibula	+	Femur	70	5·3	1	1·6	2·5	9·3T	3·6	5·2	6·1	5·6	1·4	1·6†	2·6
34	31	Femur and foot	+ +	Knee	61	4·6	2	1·7	1·2	10·4	4·0	5·7	5·2	5·4	2·8	2·5†	0·1
35	33	Patella and maxilla	+ + +	Double femur and skull	62	4·6	1	0·5	−1·2	15·4	3·6	4·1	2·4	3·2	1·0	2·0	0·2
36	26	Humerus, radius, and ulna	+ + +	..	54	4·0	1	−2·3	−2·0	16·1	4·8	2·5	2·8	2·6	†	1·0	1·6
37	25	Skull (depressed)	+ +	Ribs	65	4·9	1	−0·4	−0·8	13·9	2·4	2·0	1·6	1·8	1·1	0·2	0·5

+, + +, + + +, + + + +, for detailed interpretation see text.
R.C.V., red-cell volume. ^{32}P, radioactive-phosphorus technique.
T, Hb level before blood-transfusion for anæmia.
* Predicted normal R.C.V. = follow-up weight (kg.) × 30 (ml.), and blood volume = weight (kg.) × 75 (ml.).
† Limb swelling determined by serial circumferential measurements.

major visceral disturbances likely to interfere with the interpretation of evidence. Each patient had at least one major fracture. In table IV the extent and depth of the visible wound, irrespective of the associated fractures, are graded from + to ++++:

+ represents the type of puncture wound often seen in a fracture "compound from within"; ++ represents a more severe wound involving skin damage or undermining of not more than one hand in area, with visible damage to structures beneath the level of the deep fascia; +++ represents a major wound with more extensive damage to skin, extensive undermining, and obvious severe damage to deep structures; and ++++ represents a degree of damage sufficient to warrant immediate primary amputation.

Blood-loss calculated from red-cell volume was measured as described for closed injuries (table I): A shows the whole-blood deficit or credit—i.e., the difference between the measured red-cell volume (day 1–3 after injury) and the "predicted normal" red-cell volume derived from (*a*) follow-up weight, and (*b*) follow-up ^{32}P red-cell volume. The lowest Hb level recorded during the ensuing two weeks is included as a further guide to whole-blood credit or deficit. B shows the blood transfused. Whole-blood loss (A + B) is calculated separately from follow-up weight and ^{32}P red-cell volume and arbitrarily averaged.

Such estimates of blood-loss can be compared with the estimate (C) based on measurements of blood-loss and limb swelling. The difference between the blood-loss derived from these two approaches (*remaining deficiency*) is discussed in individual case-histories.

Case 28.—A labourer, aged 43, was injured by a falling wall. Twenty minutes later he was warm and pink, not sweating, with pulse-rate 70, B.P. 150/95 mm. Hg, a bruised loin, and fracture of the tibia and fibula open through a $^1/_4$ inch laceration. Under general anæsthesia the fracture was fixed with wire, wound closed, and plaster applied. Next day he developed atelectasis, and blood-loss estimated from red-cell volume was 1·0 litre from follow-up weight but only 0·1 litre from follow-up red-cell volume. The follow-up red-cell volume remained unchanged twelve months later. On clinical grounds there was probably some blood-loss before admission. At operation under tourniquet blood-loss measured by swab-weighing was 0·1 litre. Blood-loss into tissues and dressings was about 0·5 litre. Blood-loss of 0·1 litre based on follow-up red-cell volume is certainly an underestimate. The Hb level fell from 15·5 g. per 100 ml. on admission to 13·6 g. per 100 ml. next day, and to 12·3 g. per 100 ml. the day after, suggesting an appreciable whole-blood deficit. He was given a transfusion of 1·6 litres. After a period of polycythæmia his Hb level fell to 15·5 g. per 100 ml. This suggests that he lost less blood than the 1·6 litres transfused, and probably less than 1·0 litre.

Case 29.—A miner, aged 49, reached hospital four hours after a fall of coal on to his thigh. His skin was warm and dry, ears pale, pulse-rate 80, B.P. 115/80 mm. Hg. He had a comminuted fracture of the lower femur, open through a small wound. Under general anæsthesia the wound was explored, cleaned, and sutured, and the fracture fixed in a Thomas's splint. He gave a history of partial gastrectomy for ulcer a year previously, from which he had not fully recovered. Two days after injury blood-loss calculated from red-cell volume was 1·9 litres by follow-up weight and 3·1 litres by follow-up red-cell volume. On admission and for some weeks afterwards he had a sallow complexion, anxious facies, and low serum-protein and serum-iron levels. On discharge he thought he looked better and had put on weight. Blood-loss estimated from follow-up red-cell volume is probably excessive because he was probably both anæmic and oligæmic before injury. Blood-loss into a polythene bag and by swab-weighing at operation was 0·5 litre. Limb swelling was 1·1 litres, suggesting a total blood-loss of 1·5–2·0 litres. The remaining deficiency can be accounted for by anæmia before admission. His Hb level fell from 12·3 g. per 100 ml. on admission to 8·7 g. per 100 ml. eight days later, averaging 14·2 g. per 100 ml. from follow-up studies. The evidence suggests blood-loss of 1·5–2·0 litres by the second day.

Case 30.—A man, aged 35, involved in a motor-cycle accident, reached hospital twenty-five minutes later, with fractures of clavicle and shaft of femur, the latter open through a contaminated laceration. Under general anæsthesia the wound was cleaned, explored, and closed, and the fracture reduced and fixed in a Thomas's splint. His general condition remained excellent for three days. He then developed pain and swelling from infection of the fracture hæmatoma. For a time it seemed that the limb would be lost, but eventually infection was controlled. He was left with a stiff but painless knee. Two days after injury blood-loss calculated from red-cell volume was 1·4 litres from follow-up red-cell volume and 1·2 litres from follow-up weight, average 1·3 litres. Primary limb swelling was estimated to be less than 1·0 litre. Blood-loss at operation by swab-weighing was 0·3 litre. The lowest Hb level on the fourth day after injury was 11·9 g. per 100 ml. The evidence suggests whole-blood loss of about 1·3 litres during the first two days.

Case 31.—A painter, aged 30, was involved in a road accident. Two and a half hours after injury his skin was pale and cold, B.P. 125/80 mm. Hg, pulse regular, good volume, rate 80. He had a fracture of the left tibia and fibula open at a small wound. The left hip was dislocated, the leg was tensely swollen, foot cold. At operation the hip was reduced; the leg wound excised, explored, and sutured; and the fracture reduced and put in plaster. Later a bruise of the shoulder was found. Two days after injury blood-loss calculated from red-cell volume was 2·0 litres. Blood-loss from the wound by swab-weighing was 0·4 litre; measured swelling of the leg was 1·0 litre. The remaining deficiency of 0·8 litre could be explained by extravasation at the site of his hip and shoulder injuries. Hb level fell to 10·3 g. per 100 ml. on the seventh day. The evidence suggests a primary blood-loss of about 2·0 litres.

Case 32.—An engineer, aged 60, was knocked off his bicycle. Two hours after injury he was found to have an open comminuted fracture of the lower femur. He was conscious and pale, neither restless nor sweating, with nose and forehead warm, pulse and B.P. normal. Under general anæsthesia the wound was cleaned and sutured and the fracture reduced and splinted. He was transfused with 2·4 litres of blood. The wound healed uneventfully. Two days after injury blood-loss from red-cell volume studies was (*a*) 3·0 litres, and (*b*) 3·4 litres, mean 3·2 litres. Before and during operation external blood-loss was estimated at 1·0 litre and limb swelling 1·5 litres. The remaining deficiency of 0·7 litre could be due to blood-loss to the outside before admission. Hb level was 13·0 g. per 100 ml. on the day after admission and fell to 9·9 g. per 100 ml. on the eleventh day. Taken as a whole the evidence suggests primary blood-loss of about 3·0 litres.

Case 33.—A boy, aged 16, was involved in a motor-cycle accident. Forty minutes later he was pale, not sweating, with extremities cold, face warm, pulse-rate 72, B.P. 85/55 mm. Hg, rising to 110/75 mm. Hg within an hour. He had fractures of the wrist and foot and a severe open fracture of the middle of the leg. Under general anæsthesia one and a half hours after injury the leg was amputated at the fracture site. He received 9 bottles (3·6 litres) of blood. His post-operative condition was excellent. On the day after injury and transfusion whole-blood loss from red-cell volume studies was (*a*) 2·8 litres and (*b*) 3·3 litres, mean 3·0 litres. Blood-loss at operation by swab-weighing was 2·0 litres, and swelling of the limb 0·7 litre. Hb level fell from 16·5 g. per 100 ml. on admission to 13·7 g. per 100 ml. on the seventh day, Total blood-loss was about 3·0 litres or more.

Case 14.—A polisher, aged 21, was involved in a road collision. An hour and a half later he was pale and cold. He had a double closed fracture of the femur with a large hæmatoma, fractured tibia and fibula, with extensive skin and muscular damage. His pulse was regular, volume poor, B.P. 110/70 mm. Hg. After 1 bottle of blood the B.P. rose to 150/80 mm. Hg. Three hours after admission the leg was amputated through the fracture site, and the fractured femur treated by traction, under general anæsthesia. Two days after injury and transfusion of 2·8 litres of blood, whole-blood loss from red-cell volume studies was estimated as (*a*) 3·3 litres and (*b*) 2·7 litres, mean 3·0 litres. Blood-loss before and during operation was found to be 0·6 litre. Swelling of the thigh was about 2·0–2·5 litres. A small remaining deficit could be explained by bleeding before admission and further bleeding into the tissues and dressings after operation. Hb level fell to 10 g. per 100 ml. two days later. The evidence suggests blood-loss of at least 3·0 litres and possibly more.

Case 12.—A foreman, aged 48, was involved in a motor-cycle accident. Fifteen minutes later his skin was pale and

warm, pulse-rate 85, B.P. 150/85 mm. Hg. He had a double closed fracture of the shaft of the femur and an open fracture of the same leg. Bleeding from the open fracture had soaked the leg of his trousers. At operation two hours later the leg wound was explored and the fracture plated. A laceration of the other leg was sutured and the fracture of the femur treated by skeletal traction. He received 9 bottles (3·6 litres) of blood; his postoperative condition was excellent. Two days after injury he became irrational, developed a rash, and was dyspnœic. Fat-embolism was diagnosed. During the following week he improved steadily, but recovery was complicated by sloughing of the skin over the leg fracture. On the day after injury and transfusion whole-blood loss calculated from red-cell volume was (*a*) 5·2 litres and (*b*) 6·1 litres, mean 5·6 litres. Blood-loss before and during operation was estimated at 1·4 litres, including 1·1 litres measured by swab-weighing; swelling of the thigh was 1·6 litres. The remaining deficit might be due to (1) blood-loss before admission, (2) extravasation into the leg, and (3) blood disappearance associated with the processes later diagnosed as fat-embolism. Hb level fell to 9·3 g. per 100 ml. on the fourth day, when another transfusion was given. The evidence suggests considerable whole-blood deficit at the end of emergency treatment in spite of a large transfusion, with total blood-loss of more than half his blood volume.

Case 34.—A carpenter, aged 31, struck on the leg by a crane, was admitted to hospital forty minutes later, cold and pale, with B.P. 110/80 mm. Hg, pulse-rate 110. He had a deep laceration of the foot and enormous swelling of the left thigh, with an anterior puncture wound, and transverse fracture of the femur with wide separation. Under general anæsthesia a complete tear of ligamentous structures on the medial side of the knee was found. At operation the femur was fixed with a Küntscher nail. The exploration allowed evacuation of a hæmatoma and closure of the deep muscles. The laceration of the foot was cleaned and sutured. On return to the ward after transfusion of 9 bottles (3·6 litres) of blood the extremities were cold and his blood-pressure had fallen. After 1 more bottle (0·4 litre) his condition improved. He improved steadily thereafter. On the day after admission blood-loss from red-cell volume studies was (*a*) 5·7 litres and (*b*) 5·2 litres, mean 5·4 litres. The limb swelling was great; serial circumferential measurements suggested an increase in volume of 2·5 litres or more. Blood-loss to the outside was about 2·8 litres, including 1·8 litres measured by swab-weighing. Hb level fell to 10·4 g. per 100 ml. on the eleventh day. Taken as a whole the evidence suggests a total blood-loss of about 5·5 litres.

Case 35.—A man, aged 33, involved in a motor-cycle accident, arrived at hospital three hours after injury, conscious but lethargic, with skin pale and cold, B.P. 180/70 mm. Hg, pulse-rate 56. He had a severe fracture of the skull, fractures of the mandible, lacerations of the chin, fractures of the right radius and 1st and 2nd metacarpals, bilateral closed fractures of the shaft of the femur, and an open fracture of the patella. Transfusion was started and continued overnight. Next morning the knee wound was cleaned and sutured and the patella excised. The mandible was wired, the malar bone raised, the wrist put in plaster after manipulation, and the lacerations sutured. The pulse-rate remained slow—50–60—for some hours after admission. Subsequently he was proved to have an intracranial lesion which left him permanently blind. He proceeded to make an otherwise satisfactory recovery. On the day after admission, after transfusion of 9 bottles (3·6 litres) of blood, whole-blood loss calculated from red-cell volume studies was (*a*) 4·1 litres and (*b*) 2·4 litres, mean 3·2 litres. Follow-up ^{32}P red-cell volume was estimated in this patient when he was confined to bed and could not be weighed. He was not weighed until some months later. Probably the whole-blood loss estimated at 4·1 litres is more accurate than that based on early follow-up red-cell volume. The known swellings could account for 2·0–2·5 litres. He probably lost something like 1·0 litre of blood to the outside. If the blood-loss calculated from red-cell volume is taken as 4·1 litres, the remaining deficit could be accounted for by oozing into dressings and underestimate of limb swelling. The Hb level showed no significant fall; this suggests that blood-loss was satisfactorily replaced by transfusion. The total evidence therefore suggests a blood-loss of 3·5 litres.

Case 36.—A house-painter, aged 26, was involved in a road smash. Two hours later he was pale and restless, with cold extremities, B.P. 105/60 mm. Hg, pulse-rate 80. He was mildly concussed, with extensive injury to the right arm; multiple fractures of humerus, radius, and ulna; partial dislocation of the elbow; and damage to skin and muscles. Surgery was delayed for observation of his cerebral state. Blood-transfusion was continued through the night and during a two-hour operation next morning. Considerable bleeding took place before and during operation, at which the humerus was plated and the wound was cleaned and closed by suture and skin grafting. He received 12 bottles (4·8 litres) of blood. Next day whole-blood loss from red-cell volume studies was (*a*) 2·5 litres and (*b*) 2·8 litres, mean 2·6 litres. The limb swelling probably amounted to 1·0 litre, leaving a remaining deficiency of 1·6 litres, which could be explained by bleeding before and during operation. This case emphasises the difficulty of assessing blood-loss at operation without swab-weighing. Hb level did not fall below 17·1 g. per 100 ml. during the two weeks after trauma. The follow-up value was 15·0 g. per 100 ml. This supports our red-cell evidence that he received more blood than he had lost. The evidence suggests blood-loss of about 2·5 litres.

Case 37.—A fitter's mate, aged 25, fell down a lift shaft and sustained an open depressed fracture of the skull with no brain damage. Half an hour after injury the B.P. was 128/60 mm. Hg, and pulse-rate 86. Radiographs showed fractures of ribs 8, 9, and 10. After a period of observation the fractured skull was explored, bone was removed, and the wound was closed. He left hospital after sixteen days. On the day following injury, after transfusion of 6 bottles (2·4 litres) of blood, blood-loss calculated from red-cell volume was (*a*) 2·0 litres and (*b*) 1·6 litres, mean 1·8 litres. Blood-loss by swab-weighing at operation was 1·1 litres, swelling at the site of the head injury was not more than 0·2 litre. The remaining deficit of 0·5 litre could be explained by bleeding into other sites of injury and before admission and oozing into the dressings. Hb level fell from 14·9 g. per 100 ml. on admission to 13·9 g. per 100 ml. on the ninth day. The evidence suggests blood-loss of about 2·0 litres.

In most of the patients described above the total blood-loss can be explained by limb swelling plus blood-loss to the outside, the remaining deficit being less than the error of the methods involved (probably ±1·0 litre). In 2 out of 12 patients (cases 12 and 36) the remaining deficit was more than 1·0 litre. The contribution of blood-loss into limb swelling appeared in many instances to be appreciable. The contribution of blood-loss to the outside varied from 10 to 90% of the total loss. In the three patients (cases 33, 36, and 37) in whom blood-loss to the outside exceeded 50% of the total blood-loss a large proportion of this occurred at operation, and was measured by swab-weighing in cases 33 and 37. Of the remaining 9 patients 6 showed blood-loss to the outside varying only between 10% and 25% of the total blood-loss. This suggests that blood-loss to the surface in many open fractures is often less important than blood-loss into the tissues, except where major blood-loss occurs during an operation.

Data are presented in table v on 12 other patients in whom estimates of blood-loss were based chiefly on blood-volume measurements. The table includes 3 cases (cases 38, 39, and 45) where blood was lost to the outside only during the operation; it also includes the nature of the injury and of the primary surgery.

Two of these patients received abdominal injuries associated with fractures of the pelvis. **Case 38** sustained a major rupture of the liver with a central dislocation of the hip. At operation blood-loss to the outside measured by swab-weighing was 0·8 litre. He received 3·6 litres of blood. Total blood-loss was estimated to be 5·0 litres on the tenth day after injury. At this time there had been further bleeding in association with the withdrawal of a pack used to stop hæmorrhage from the liver. **Case 39** sustained a severe fracture of the pelvis and a tear of the omentum, which was sutured at laparotomy. He received 2·5 litres of blood. Total blood-loss was estimated at 3·0 litres.

Cases 40 and 41 are examples of severe injury where amputation was only decided on after review of the extent of damage. Exploration was done in the presence of suspected vascular injury without a tourniquet; considerable blood-loss

took place during exploration. In each case a transfusion of 4·0 litres enabled this to be done safely. It was insufficient to prevent a post-traumatic whole-blood deficit of 0·9 and 1·4 litres respectively.

In **cases 42–46** blood-transfusions of 2·4, 5·2, 1·6, 2·8, and 2·4 litres were given, allowing major operations to be done in the acute phase of injury. Surgery added to loss of blood but did not increase the risk to life. Three of these patients received transfusions which exceeded blood-loss and were none the worse for it. They did not develop post-traumatic anæmia. Case 42 was left with a whole-blood deficit of 0·6 litre, and case 46 0·7 litre, the lowest Hb levels being 14·4 g. and 12·0 g. per 100 ml. respectively.

Cases 47 and 48 had multiple injuries requiring surgery as indicated in table v. Case 47 received 2·4 litres of blood and was left on the third day with a whole-blood deficit of 1·4 litres, suggesting total blood-loss of 3·8 litres. The Hb level fell to 9·9 g. per 100 ml. during the ensuing two weeks. Case 48 received 2·8 litres of blood. Blood volume on the third day suggested a deficit of 0·5 litre and total blood-loss of 3·3 litres. His Hb level fell to 9·8 g. per 100 ml. during the post-traumatic period.

Case 49 had extensive undermining of the skin, eventually leading to full-thickness loss over two-thirds of the leg (7% of the body-surface). A primary transfusion of 3·2 litres of blood was sufficient to tide her over partial excision and suture without any immediate post-traumatic oligæmia or anæmia. The estimated blood-loss was 2·9 litres.

The 24 cases presented in tables IV and V illustrate some of the factors influencing total blood-loss in some complex open and closed civilian injuries. The extent of damage to soft tissues is only a partial guide to blood-loss. Usually the bigger the wound the less measurable is the blood-loss, and the more complex the total damage the more unpredictable is the total blood-loss.

Surgery can decrease blood-loss by direct control of bleeding, removal of damaged tissues, and obliteration of dead space; it can also increase both blood-loss and tissue damage even where every effort is made to reduce the latter to a minimum. At times it is necessary to operate on a limb without a tourniquet, and then blood-loss can be considerable (case 36). With a tourniquet blood-loss at operation may be minimal (case 28).

Blood-transfusion may increase blood-loss; therefore it is impossible to say how much of the blood-loss recorded would have occurred with less transfusion or none at all. In view of the possible argument that we have misleadingly increased blood-loss by transfusion, cases 28–31 were selected as patients from whom it was clinically justifiable to withhold transfusion.

Some injuries with direct arterial damage, or in areas such as the face and scalp, may bleed out of all proportion to the size of the wound. Usually, however, there appears to be some correlation between over-all blood-loss in

TABLE V—BLOOD-LOSS FROM RED-CELL VOLUME

Case no.	Age (yr.)	Nature of injury	Visible damage to soft parts	Diagnosis	Surgery	Follow-up		Whole-blood deficit on day of R.C.V.			Lowest Hb level on day 4–14 (g. per 100 ml.)	B: blood-transfusion (litres)	A + B: whole-blood loss (litres)
						Weight or height	Blood volume (litres)*	Day of R.C.V.	Method of calculating R.C.V.	A: Whole-blood deficit (litres) calculated from predicted normal* by follow-up			
38	48	Road accident	..	Ruptured liver; concussion; central dislocation of hip	Laparotomy, packing, and extension	87 kg.	6·5	10	^{32}P R.C.V.	1·4	13·3	3·6	5·0
39	15	Caught in ash-conveyer	..	Fractured pelvis; omental tear	Laparotomy	..	4·7	2	P.V. + H'crit	0·5	14·9	2·5	3·0
40	39	Road accident	+ + + +	Open fracture of tibia and fibula into knee	Amputation	166 cm.[1]	4·5	3	P.V. + H'crit	0·9	12·6	4·0	4·9
41	45	Crushed in machine	+ + + +	Severe destruction of upper limb	Amputation of upper arm	69 kg.	5·2	1	^{32}P R.C.V.	1·4	13·8	4·0	5·4
42	57	Hit by tub of stone dust	+ +	Open fracture of tibia and fibula	Plating and rotation—flap	85 kg.	6·4	5	P.V. + H'crit	0·6	14·4	2·4	3·0
43	55	Caught in rolling-machine	+ + +	Major lacerations of both hands	Toilet, suture, and grafting	65 kg.	4·9	10	^{32}P R.C.V.	−0·9	16·6	5·2	4·3
44	38	Hit by pillar	+ +	Lacerated scalp; severe fracture of femur	Suture and extension	65 kg.	4·9	8	P.V. + H'crit	−0·6	15·3	1·6	1·0
45	26	Road accident	..	Fractured 6 ribs; fracture dislocation of thoracic spine	Open reduction and wiring of spine	51 kg.	3·8	5	P.V. + H'crit	−1·5	17·3	2·8	1·3
46	25	Crushed by tractor	+ +	Severe open fracture of femur	Toilet, plating, and suture	72 kg.	5·4	1	P.V. + H'crit	0·7	12·0	2·4	3·1
47	27	Hit by railway engine	+ + +	Gross injury to hand; open depressed fracture of skull; fractured humerus, tibia and fibula, and os calcis	Suture, exploration and elevation, plaster, spike reduction of os calcis	68 kg.	5·1	3	P.V. + H'crit	1·4	9·9	2·4	3·8
48	54	Road accident	+ + +	Concussion; lacerated scalp; open fracture of left tibia and fibular; closed fracture of right tibia and fibula	Exploration, plating and plaster	57 kg.	4·3	3	P.V. + H'crit	0·5	9·8	2·8	3·3
49	60	Run over by bus	+ + +	Destruction of $^2/_3$ of skin of thigh and leg	Toilet, excision, suture, and graft	156 cm.[2]	3·4	11	P.V. + H'crit	−0·3	15·1	3·2	2·9

+, + +, + + +, + + + +, for detailed interpretation see text. R.C.V., red cell volume.
^{32}P, radioactive-phosphorus technique. P.V., plasma volume.
*Predicted normal R.C.V. = follow-up weight (kg.) × 30 (ml.), and blood volume = weight (kg.) × 75 (ml.) with the following exceptions: 1, based on height because of amputation; figures of Gibson and Evans (1937) used with no allowance for lost limb. 2, female; figures of Gibson and Evans (1937) used.

open injuries with major fractures and the size and extent of the wound. Large wounds with total transection of deep structures, including main vessels, may appear to bleed little, but their total blood-loss is nevertheless great (case 41). We have found that, when amputation has been necessary at the acute stage through the arm, thigh, or leg, blood-loss is rarely less than 2·0–2·5 litres and often more (cases 33, 40, and 41); some of this may be due to extravasation into the stump after operation.

Blood-loss after the end of emergency treatment was rarely sufficient to alter the clinical picture. Frank hæmorrhage may come on during dressing or removal of a deep pack (case 38). Disappearance of red cells may accompany infection (case 30) or fat-embolism (case 12). Patients with severe injuries of the skin and subcutaneous tissue with gross undermining may lose large amounts of blood in the absence of bony or gross muscular damage (case 49).

In such injuries it is impossible to summarise all the factors which contribute to the extent of blood-loss, but some of them are indicated above.

Discussion and Conclusions

We have attempted to assess blood-loss associated with various civilian injuries. Apart from direct measurement of bleeding from the wound, all our methods are indirect and give information that could be regarded as somewhat inconclusive. The accumulation of evidence from different approaches convinced us that all these methods contribute to a better quantitative understanding of primary blood-loss associated with trauma. In closed injuries of the limbs we can roughly estimate the degree of blood-loss from the size of the primary swelling. Such assessment is made more easily in moderate and more peripheral injuries. The general accuracy of this approach is confirmed by studies of red-cell volume and hæmoglobin level.

Many closed fractures and injuries to soft parts are associated with blood-loss of about 0·25–0·50 litre (less than 10% of the total blood volume). They correspond to Grant's "wounds of less than one hand." Patients with such lesions do not require transfusion and, from the point of view of blood-loss, such lesions are not in themselves relevant to "traumatic shock" or "the illness of trauma." Typical examples are the common fractures of the ankle, knee, and forearm. In multiple injuries each of such injuries can contribute its quota to the total blood-loss.

We made detailed observations on closed injuries corresponding in their degree of blood-loss to the "moderate wounds" of Grant and Reeve (1951). This group is represented by the average fracture of the shaft of the femur, by some fractures of the tibia and fibula, and by major fractures of the upper limb. Some injuries to the trunk come into this category but are more difficult to assess. Such injuries lose about 0·5–1·5 litres of blood (10–30% of the total blood volume).

Multiple fractures may be associated with much greater blood-loss. On occasions a single injury to the thigh may be associated with blood-loss of 2·0–2·5 litres or even more. Fractures of the pelvis, even without major visceral damage, can lose even larger quantities of blood. Such injuries correspond to the "large" and "very large wounds" of Grant and Reeve (1951) and can lose 40–50% or more of the total blood volume.

Severe multiple injuries, however, are rarely completely closed, and some of the lesions are almost invariably associated with blood-loss to the exterior.

Blood-loss in many open fractures results from bleeding into the tissues and to the outside in variable proportions. Most of the patients studied in this series would, from the extent of total blood-loss, come into the category of "large" and "very large wounds" (Grant and Reeve 1951). Such categorisation is only partly valid, because our assessments include blood-loss at operation during the emergency phase. Without surgery some patients would have bled less and some more. In practice the distinction is not of great importance where surgery is absolutely indicated.

The extent of blood-loss in open injuries will depend moreover not only on the extent of injury but also on its treatment and on the timing of such treatment. Assessment must depend on consideration of the dynamic interplay of several individual factors. In many patients with severe or multiple injuries estimation of blood-loss to a degree of accuracy necessary for the control of transfusion may only be possible by blood-volume studies.

We did not find it necessary to introduce the suggestion of Grant and Reeve (1951) that a large unexplained disappearance of red cells may take place during the first two days after injury. The crudeness of our assessments makes it impossible to exclude a small unexplained disappearance of red cells, but in the injuries which we investigated such unexplained loss probably did not exceed 10% of the red-cell volume and was of little clinical importance compared with bleeding.

Useful guides to the amount of blood lost from local injuries are the volume of swelling and that of blood-loss to the outside. Often such information can be more important, particularly in the prevention of "shock," than assessment of blood-loss from the patient's clinical state as a whole.

Whatever attitude is adopted towards transfusion, those concerned with treating injuries in the acute phase must ask themselves certain questions: how much blood has been lost, and when, and where? How much blood is likely to be lost after admission, during operation, and postoperatively? What effects are likely to result if the blood is inadequately replaced? How do the risks involved in transfusion in the particular circumstances of the particular hospital compare with the risks of neglecting the effects of oligæmia and anæmia?

The amount of blood lost in various injuries is greater than is usually recognised but can often be diagnosed or predicted by study of the local injuries even in the absence of clinical signs of "oligæmic shock." *

Summary

Blood-loss was studied in 49 injured patients.

Blood-loss from 10 closed limb injuries was calculated from red-cell volume studies.

Blood-loss from 19 closed limb injuries was estimated by comparison of the volumes of injured and normal limbs.

Blood-loss from 12 open injuries was estimated by (*a*) red-cell volume studies, (*b*) hæmoglobin studies, and (*c*) estimation of blood-loss in limb swelling and to the outside.

Further evidence of the amount of blood lost in various injuries is based on blood-volume studies on 12 patients.

Further evidence of blood-loss in closed injuries is derived from hæmoglobin studies on 75 patients (additional to the above) with fractures of the shaft of the femur.

An attempt is made to record photographically the appearance of various volumes of swelling.

* Since this paper was written Prentice et al. (1954) have published an important study of blood volume and blood-transfusion therapy based on experience gained in the Korean war. If account is taken of the very serious nature of many of the injuries studied by them, their observations clearly bear a close relationship to our observations on less severe civilian injuries. They attribute the discrepancies between the large amounts of blood given and the small blood volumes determined subsequently to bleeding "either externally or into the tissues during the pre-operative, operative, and postoperative periods."

This evidence is used to define the amount of blood-loss associated with various injuries, with particular emphasis on the contribution of limb swelling.

It is suggested that quantitative assessments based on such methods can provide a guide to the need for blood-transfusion.

We are indebted to Mr. R. Gill and Mr. C. Richardson for the photographs; Mr. J. L. Davies, B.SC., for help in determining red-cell volumes; Mr. H. Lilley and Mrs. M. Evans for laboratory assistance; Dr. Simon Sevitt, clinical pathologist at the Birmingham Accident Hospital, for his coöperation; Dr. W. Weiner, of the Regional Blood Transfusion Service, for his interest and assistance; and, in particular, Dr. J. P. Bull, director of the M.R.C. Industrial Injuries and Burns Research Unit, for his support and advice. This work would not have been possible without the facilities for the treatment of injuries available to us at the Birmingham Accident Hospital.

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TREATMENT OF PULMONARY SARCOIDOSIS WITH STREPTOMYCIN AND CORTISONE

CLIFFORD HOYLE
M.D. Lond., F.R.C.P.

CONSULTING PHYSICIAN, KING EDWARD VII SANATORIUM, MIDHURST, SUSSEX; PHYSICIAN, KING'S COLLEGE HOSPITAL AND BROMPTON HOSPITAL, LONDON

JOHN DAWSON
M.C., M.D. Lond., M.R.C.P.

MEDICAL CHIEF ASSISTANT, BROMPTON HOSPITAL, LONDON

GORDON MATHER
M.A., M.D. Camb., M.R.C.P.

SENIOR MEDICAL REGISTRAR, KING'S COLLEGE HOSPITAL, LONDON

WHEN effective chemotherapy for tuberculosis was discovered, it was logical to try this in sarcoidosis because the two maladies may be related. Later, when cortisone became available, we used it together with streptomycin and *p*-aminosalicylate (P.A.S.) because of its action in controlling productive inflammation. We describe here their effects on 38 selected patients with pulmonary sarcoidosis.

Methods and Material

A strictly controlled therapeutic trial was impracticable because so few patients were available. We chose the alternative of watching the course of the disease in each patient, before treatment, for long enough to establish an unfavourable trend and then observing the effect of treatment on subsequent progress.

The diagnosis of sarcoidosis was based primarily upon the radiological changes in the lungs. When the disease was recent, the hilar lymph-nodes were usually enlarged and the lungs showed either numerous symmetrical miliary opacities (fig. 1*a*) or fewer and larger opacities up to a few centimetres in diameter (fig. 2*a*). Older disease showed as fine reticulation or coarse linear or massive shadows, often with distortion of the hilum by severe fibrosis (fig. 3*a*). No case with enlarged hilar lymph-nodes alone was treated. 8 patients with pulmonary lesions also had uveitis, 4 severely. All the patients had at least two sputum or gastric-lavage cultures set up before treatment; none grew *Mycobacterium tuberculosis*. Tuberculin sensitivity was usually low or absent. Epithelioid cell follicles, typical of sarcoidosis, were found at biopsy in 36 patients in liver (30), lymph-nodes (6), skin (5), lungs (2), and conjunctiva (1).

Streptomycin Series

30 patients were treated with streptomycin sulphate and sodium P.A.S. There were 11 males and 19 females, aged 13–63. With 4 exceptions the disease had been present for at least six months, and in 11 for more than two years, without showing spontaneous improvement. The onset was dated from the first definite symptom—e.g., iritis and erythema nodosum—or from the first abnormal radiograph; so the date is only approximate. Pulmonary symptoms were at first so slight that they were an unreliable guide to the duration of the disease.

Streptomycin was given intramuscularly in doses of 1 g. daily. 7 patients were treated for six to eight weeks, 13 for three months, and 10 for six to twelve months. 7 of these latter patients received streptomycin only twice or thrice weekly. All the patients also received at least 12 g. of P.A.S. daily.

Cortisone Series

20 patients were treated with cortisone acetate, streptomycin, and P.A.S., including 12 who had not responded to streptomycin and P.A.S. There were 3 males and 17 females, aged 19–63. 9 were treated for two months, and the rest for four months to a year. At first we used cortisone when the disease was severe or long-standing and had a bad prognosis. Later we treated less advanced cases. Cortisone was given in doses of 150 mg. orally each day for two months, and in doses of 75–100 mg. subsequently to those who continued treatment. All the patients were also given streptomycin 1 g. each day or twice weekly with calcium P.A.S. The consumption of salt was restricted, and a close watch was kept for side-effects; in particular the weight and blood-pressure were recorded regularly and the urine was tested for sugar. Our early cases were treated at rest in hospital, but later we allowed ambulant treatment at home with supervision at a special clinic. Patients were encouraged to do light work when they were fit enough.

Assessment of Results

The effects of treatment were judged mainly by chest radiographs and by serial liver biopsies. The degree of radiological improvement was graded as slight or moderate when the opacities diminished by less than 50%, and great when they diminished by more than this. Pulmonary symptoms and signs were variable even before treatment was given and were therefore unreliable guides to progress. The function of the lungs was studied before and during, or at the end of, treatment in 4 patients given streptomycin and P.A.S. and in 7 given cortisone. The factors tested were maximal breathing capacity, ventilation at rest, lung volumes, and mixing efficiency estimated with a helium-oxygen mixture.

The results of treatment were analysed in relation to the estimated duration of the disease. The rate and extent of radiological improvement in the patients with pulmonary sarcoidosis treated with streptomycin were compared with those of 12 patients with pulmonary tuberculosis treated in the same way. All the latter had widespread pulmonary infiltration, and tubercle bacilli in the sputum: they were 7 males and 5 females, aged 18–52.

Results

Streptomycin

30 patients with pulmonary sarcoidosis were treated with streptomycin and P.A.S. (table I). Judged radiologically 12 were unchanged and 12 improved. 6 others also improved; but since this improvement was not closely related to the period of treatment it was regarded as spontaneous. The remaining 24 patients were analysed in two groups:

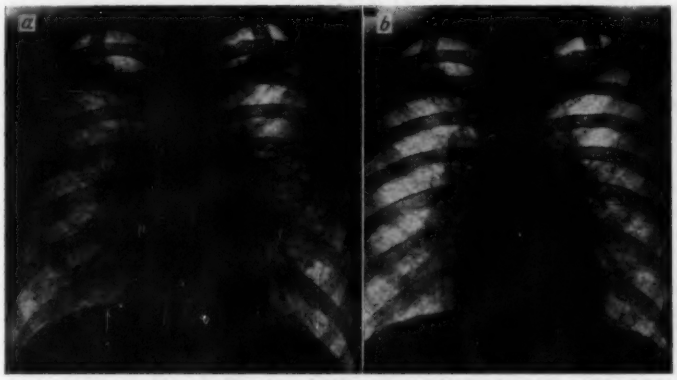

Fig. 1—Pulmonary sarcoidosis in a man aged 25: *a*, before treatment and a year after onset; *b*, after two months' treatment with streptomycin.

Liver biopsy showed sarcoid follicles. Despite increasing infiltration for one year there was complete radiological clearing after three months' treatment.

Group I comprised 9 patients with disease of at least two years' duration, the average being three and a half years; nearly all of them had conspicuous dyspnœa and either confluent or linear opacities, or both, in the chest radiograph (fig. 3*a*). Group II comprised 15 patients whose disease had been present for less than two years.

Only 1 patient out of 9 in group I showed any radiographic improvement; in group II 11 out of 15 improved, 8 of these greatly, 3 of them completely. Typical appearances before and after treatment are shown in fig. 1. 5 patients had uveitis: in 2 the inflammation subsided during treatment; the others were not improved.

The duration of the disease before treatment, the time of onset and the duration of radiographic clearing in each patient who improved were compared with those of the 12 patients with pulmonary tuberculosis treated in the same way (fig. 4). Improvement usually began after one to three months, and in this respect and in the time taken for maximal improvement the patients with sarcoidosis resembled those with pulmonary tuberculosis.

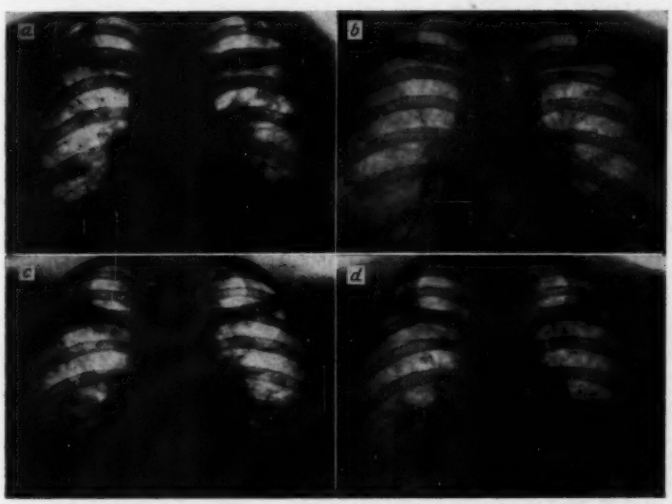

Fig. 2—Pulmonary sarcoidosis in a girl aged 18: *a*, before treatment; *b*, after two months' treatment with cortisone and streptomycin; *c*, relapse four months after treatment; *d*, after a year's further treatment.

She had general ill health, an enlarged spleen and increasing pulmonary infiltration for two years, all of which responded to treatment.

Only 1 patient of those who were breathless benefited in this respect after treatment, and this happened although the disease was advanced. There was, however, no corresponding change radiographically or in the physiological tests. Three others with mild dyspnœa on exertion and slightly abnormal breathing tests were unchanged, judged either clinically or by laboratory tests, although the radiographic change was striking.

Serial biopsies were done in 9 of the patients with sarcoidosis who had follicles in the liver before treatment. After treatment the liver was normal in 2; the follicles were smaller and somewhat more fibrous in 2, and fewer but larger in 3. The remaining 2 who did not improve radiographically did not show any histological change. All these features, including increase in size of the follicles have been found also during natural healing (Mather, Dawson, and Hoyle unpublished).

The 12 patients who improved during treatment with streptomycin and P.A.S. were followed for from one and a half to five years. 3, who had shown only slight radiographic clearing, have relapsed. 2 of these had had their disease for at least eighteen months before treatment, and all 3 were treated early in the series for three months only. The remaining 9 are well and have not deteriorated.

TABLE I—RADIOLOGICAL ASSESSMENT OF RESULTS OF TREATMENT OF PULMONARY SARCOIDOSIS WITH STREPTOMYCIN AND P.A.S.

Duration of disease (yr.)	No. treated	No change	Improvement	Improvement unrelated to treatment
More than 2 ..	9	8	1	0
Less than 2 ..	21	4	11	6
Total	30	12	12	6

Cortisone and Streptomycin

20 patients were treated with cortisone, streptomycin, and P.A.S. The results were analysed in the same way as the results of antibacterial therapy alone (table II). 11 patients whose disease had been present for more than two years (group I) were treated; 8 of them had already not responded to streptomycin with P.A.S. All were dyspnœic before treatment, 6 severely; only 2 were less short of breath afterwards. 2 patients had splenomegaly, which diminished. 8 of the 11 in this group improved to some extent radiographically, although appearances suggested that they had extensive fibrosis and emphysema. Fig. 3 illustrates a typical example.

In group II, where the disease had been present for less than two years, the results of treatment were much better than in group I. The pulmonary infiltration improved in all 9 patients, greatly in 5. Moreover the improvement was more rapid than after antibacterial treatment alone; it began in about two weeks and reached a peak in four to six weeks. Fig. 5 shows an example. Only 2 patients in this group were dyspnœic, but neither got relief.

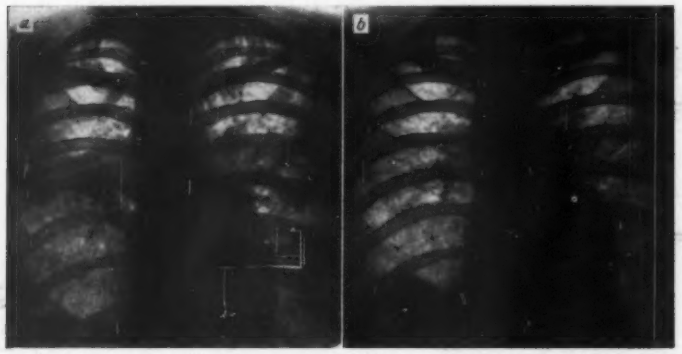

Fig. 3—Pulmonary sarcoidosis in a woman aged 30: *a*, before treatment and seven years after onset; *b*, after two months' treatment with cortisone and streptomycin.

She had progressive dyspnœa and an enlarged spleen, and liver biopsy showed sarcoid follicles.

Although nearly all the patients who received cortisone had their most serious lesions in the lungs, a few had important changes elsewhere. 4 had uveitis, 2 severely, which cleared completely during treatment. One of these had a granulomatous conjunctivitis and cutaneous sarcoids as well, which healed but left slight scarring. Another had, in addition to the uveitis, hypercalcæmia with evidence of renal damage and generalised lymph-node enlargement; all these features responded well to treatment. Of the 4 patients with uveal-tract sarcoidosis 2 have maintained their improvement two and six months after stopping cortisone, but 2 have required prolonged treatment.

The function of the lungs was studied before and during treatment in 7 patients. 5 of these were severely breathless; in 3 neither symptoms nor lung function improved, although there was some radiographic clearing in 1 of them. The 2 others, whose radiographs showed moderate clearing, were less short of breath; 1 of these had an increased maximal breathing capacity and a reduced residual air-space, due to relief of bronchospasm; the other showed no change in the tests. The 2 patients who were only slightly breathless had little abnormality in lung-function tests and were unimproved by treatment in these respects, although there was a good radiographic response.

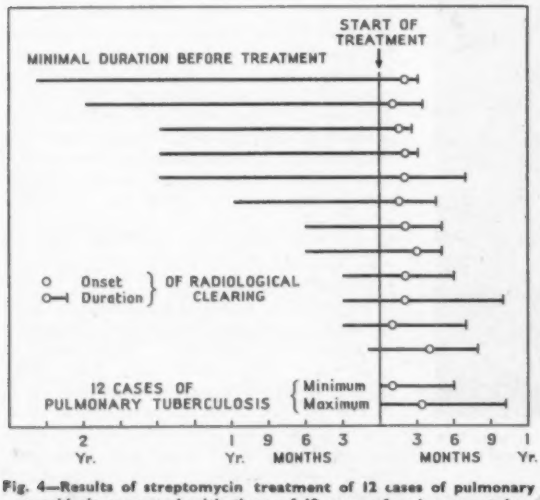

Fig. 4—Results of streptomycin treatment of 12 cases of pulmonary sarcoidosis compared with those of 12 cases of pulmonary tuberculosis.

Serial liver biopsies were taken from 8 patients in this series. In 3 the sarcoid follicles completely disappeared during treatment. In 3 others the follicles became less numerous, smaller, and more fibrous (fig. 6): in the remaining 2 the follicles were fewer but larger and contained more hyaline material.

19 of the 20 patients in this series were followed after treatment, up to three years in the earliest cases (table III). Of the 16 whose pulmonary lesions improved 11 relapsed completely and 4 partially, all within two months. The remaining 1 is fit and has a normal radiograph six months after completing treatment. Eventually 3 of those who relapsed had an even more abnormal radiograph than before cortisone was given. 3 patients with advanced disease, who neither improved nor deteriorated during treatment, died six to eighteen months later, apparently in the natural course of their illness.

It is evident that the use of cortisone and streptomycin for a short period usually confers only temporary benefit, especially on the lungs. More prolonged treatment has therefore been tried. 3 patients have now been treated for nine to eighteen months; all of them have, so far, maintained their initial improvement. Fig. 2 illustrates a typical example. None of them has had serious side-effects or shown evidence of progressive tuberculosis. The eventual results of this prolonged treatment have yet to be assessed.

TABLE II—RADIOLOGICAL ASSESSMENT OF RESULTS OF TREATMENT OF PULMONARY SARCOIDOSIS WITH CORTISONE, STREPTOMYCIN, AND P.A.S.

Duration of disease (yr.)	No. treated	No change	Slight or moderate improvement	Great improvement
More than 2 ..	11	3	7	1
Less than 2 ..	9	0	4	5
Total	20	3	11	6

Discussion

There is no general agreement on whether any form of treatment is effective for pulmonary sarcoidosis. It is difficult to judge the worth of any remedy, because of the variable duration and severity of the disease. The problem is to avoid giving treatment unnecessarily to patients who may recover unaided, and yet not to delay it until permanent fibrosis prevents success. In studying the effects of streptomycin and cortisone we have tried to allow for these difficulties by relating the effects of treatment to the duration of the disease.

Streptomycin Treatment

The first report of the use of streptomycin for pulmonary sarcoidosis was that of Pulaski and White (1948), who treated 7 patients for two to sixteen weeks without improvement. Gendel et al. (1952) have reported 6 cases treated for three to seventeen weeks without benefit, and Brun et al. (1952) mention another. On the other hand, Gernez-Rieux et al. (1948) reported a single success, and Hedvall (1950) reported 6 patients, all of whom improved during treatment for one to three months.

The present results show that pulmonary sarcoidosis of more than about two years' duration is not affected by antibacterial therapy (table I). In 4 of our patients in this group, and in 2 others who were untreated, either

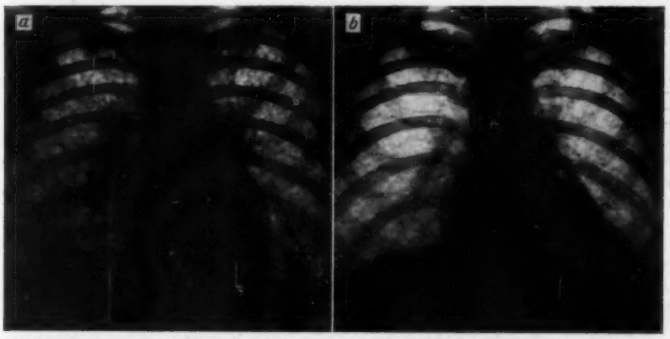

Fig. 5—Pulmonary sarcoidosis in a woman aged 26 : *a*, before treatment and eighteen months after onset ; *b*, after two months' treatment with cortisone and streptomycin.

She had ten months' history of iridocyclitis, loss of weight, and cough, and liver biopsy showed sarcoid follicles. After treatment there was complete radiological clearing and liver biopsy was normal.

lung biopsy or necropsy confirmed the presence of severe pulmonary fibrosis (fig. 7). On the other hand, more recent disease usually responded : 9 of 15 such patients improved considerably. The histology of the lung from 2 of our patients with recent disease shows that the infiltration is composed mainly of epithelioid cell follicles at this stage. We have attempted to follow the histological changes by serial liver biopsies done in 9 patients who improved. All of them had characteristic sarcoid follicles before treatment. The changes after treatment were variable and not consistent enough to be of much help in judging the progress of the individual case.

The time of onset of radiographic improvement during treatment with streptomycin and P.A.S. was closely related to the start of treatment (fig. 4). This relationship counters the argument that improvement might have occurred naturally. Also the time of onset of improvement and the period within which it was completed were similar in a group of patients with chronic pulmonary tuberculosis. These similarities are compelling evidence that the common type of sarcoidosis in this country is a form of tuberculosis. Others have found, as we have, that streptomycin is by no means always effective. The most obvious reason is that the disease is fibrotic, and no recovery can then be expected. However, some of our early cases also did not improve. A possible explanation is that the disease pattern of sarcoidosis has more than one origin. Both these factors would have to be taken into account if a controlled trial with streptomycin were to be undertaken on a large scale.

Cortisone Treatment

All accounts of the use of cortisone agree that it has a pronounced effect on most forms of sarcoidosis. Reports so far have come mainly from the United States, where severe acute pulmonary sarcoidosis seems to be common (Siltzbach 1952, Lovelock and Stone 1953). These patients, many of whom are Negroes, have fever, conspicuous breathlessness, cough, and loss of weight, as in 11 of the 15 cases reported by Shulman et al. (1952). Our cases have been rather different : severe constitutional symptoms were never seen, and breathlessness only late in a chronic course. In the absence of such features we have relied mainly on radiological changes for assessing the degree and permanence of any improvement.

Our results from using cortisone with antibacterial therapy confirm the frequency, extent, and rapidity of radiographic improvement in the lungs in many cases. However, there is some variation in the proportion improving, as reported by other workers (table IV). Differences in dosage do not seem to be responsible. Israel et al. (1954) noted that patients with symptoms of less than six months' duration improved much more than others. Analysis of our cases according to the duration of the disease showed similarly that improvement was more frequent and complete when the disease was recent (table II).

Abnormalities of lung function, estimated in the laboratory, accord with the severity of any disability. Patients with recent disease and negligible symptoms usually have normal lung function. Those with older and more fibrotic disease show hyperventilation at rest and reduced

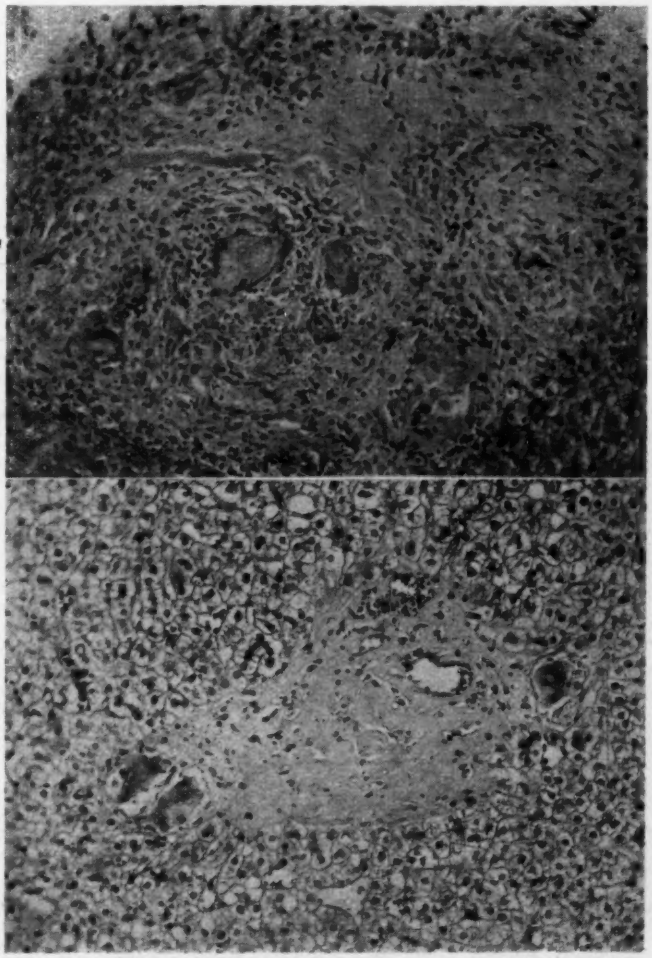

Fig. 6—Biopsy specimen of liver from same woman as in fig. 3 : *a*, before treatment ; *b*, after two months' treatment with cortisone and streptomycin. There is absorption of cellular exudate and condensation of fibrous tissue present before treatment. (Hæmatoxylin and eosin. × 140.)

TABLE III—RADIOLOGICAL ASSESSMENT OF RELAPSE AFTER TREATMENT OF PULMONARY SARCOIDOSIS WITH CORTISONE, STREPTOMYCIN, AND P.A.S.

Duration of disease (yr.)	No. treated	No. improved	Relapse		No. remaining improved
			Partial	Complete	
More than 2 ..	11	8	1	7	0
Less than 2 ..	8	8	3	4	1
Total ..	19	16	4	11	1

maximal breathing capacity. The total lung volume and its subdivisions are diminished, and usually there is no evidence of emphysema. Occasionally, when there is advanced disease, bronchial obstruction leads to over-inflation of the lungs (Lukas 1951, McClement et al. 1953). When this is due to bronchospasm, cortisone may give symptomatic relief, as happened in 1 of our patients. These abnormalities of lung function are similar to those which other workers have found (Baldwin et al. 1949, Galdston et al. 1951). However, it requires the elaborate technique devised by Riley et al. (1951) to detect the most important defect in lung function in this disease, which is a delayed diffusion of gas across the alveolar membrane (Riley et al. 1952). Estimation of the oxygen gradient between alveolus and capillary is the most sensitive method of following the physiological changes during treatment. It was not available for our investigations, which therefore only show that the ordinary tests in current use are not sensitive enough to detect changes during treatment in most instances. Moreover even the more detailed method has not so far helped in selecting cases most likely to respond to cortisone—a decision which must be made chiefly from the duration and severity of symptoms and from the radiographic appearances.

Some of our patients with pulmonary sarcoidosis have had serious lesions elsewhere. Uveitis is often a grave manifestation of the disease and may in a short time seriously impair vision. It has been found to respond well to cortisone. Shulman et al. (1952) reported 9 examples of active uveitis, all except 1 responding well to corticotrophic hormone or to cortisone, though 5 relapsed and required further treatment. Ainslie and James (1953) have reported 4 other examples: 2 with anterior uveitis were controlled with local cortisone, and 2 with more posterior lesions required systemic cortisone followed by local treatment to control the inflammation. 4 of our patients who had uveitis responded well, the active inflammation subsiding in two weeks. They have all had cortisone for at least four months: 2, with serious lesions, for six and eighteen months; the other 2 are well two and six months after the end of treatment. The risk of relapse seems to affect eye lesions just as frequently as other forms of sarcoidosis, and prolonged treatment, either local or systemic, is often required.

Accounts of the effects of cortisone on the follicles of sarcoidosis are limited to a few biopsy reports, chiefly on lymph-nodes and skin. Siltzbach (1952) did biopsies in 8 of his 13 cases before and after treatment with cortisone, but not on the liver. In 5 the follicles were replaced by hyalinised fibrous tissue; 2 of these showed remains of granulomatous lesions. 3 were unchanged. Lovelock and Stone (1953) twice found similar substitution by hyaline connective tissue at the site of Kveim reactions. A pronounced effect on the hepatic disease was seen in 8 of our patients given cortisone. Sarcoid follicles in the liver either disappeared or became smaller and fibrotic during treatment. From this it is reasonable to deduce that absorption of cellular sarcoid follicles is a chief cause of radiological clearing in the lung fields. Residual shadows are due mainly to persistent fibrosis, as shown in our series by a lung biopsy after treatment (fig. 7) and by necropsies. Our observations of serial liver biopsies show an increase of fibrous tissue which is apparent rather than real; it is due to the disappearance of the cellular elements from the follicles, with condensation of existing fibrous tissue (fig. 4*a* and *b*). The increased fibrosis which has been noted in recessive lymph-nodes (Siltzbach 1952) is probably due to the same process. We have not found any evidence that treatment with cortisone produces an absolute increase of fibrous tissue. On the contrary, it is likely that cortisone, by suppressing the cellular follicles of sarcoidosis, prevents further fibrosis in the organs involved.

The risks during treatment of sarcoidosis with cortisone do not differ from those met with in other diseases, with one possible exception. There is experimental evidence that cortisone reduces resistance to *M. tuberculosis* (Hart and Rees 1950), and because of the possible association between this organism and sarcoidosis we felt it wise to give streptomycin as well. Although more than 100 cases treated with cortisone alone have now been recorded, only 5 have developed tuberculosis. Lovelock and Stone (1953) reported 4 of these where the

TABLE IV—RADIOLOGICAL ASSESSMENT OF RESULTS OF TREATMENT OF PULMONARY SARCOIDOSIS WITH CORTISONE OR WITH CORTICOTROPHIN

Reference	No. treated	No. improved radiologically	3 mos. after treatment			No. remaining improved
			Relapse partial	Relapse complete	No record	
Michael (1951)	5	5	0	5	0	0
Small (1951)	3	3	1	0	0	2
Shulman et al. (1952)	10	8	2	3	1	2
Siltzbach (1952)	7	4	1	0	2	1
Carstensen and Norvilt (1953) ..	12	6	0	0	0	6
Lovelock and Stone (1953) ..	7	6	0	1	0	5
Israel et al. (1954)	26	17	3	6	0	8
Present series	19	16	4	11	0	1
Total	89	65	11	26	3	25

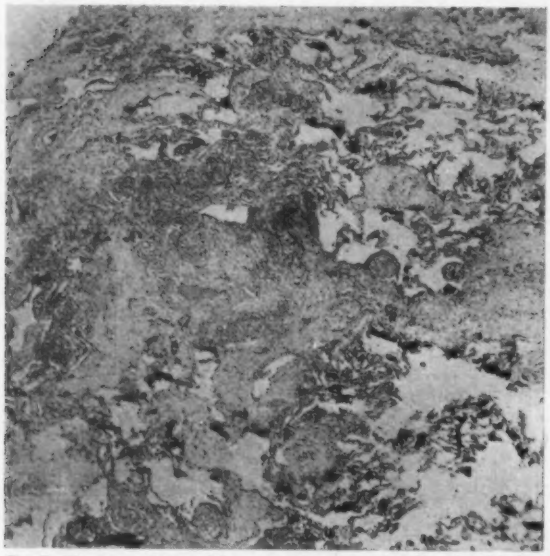

Fig. 7—Biopsy specimen of lung, showing extensive fibrosis with few persisting epithelioid cell follicles, from a woman, aged 53, who had pulmonary sarcoidosis for three years. (Hæmatoxylin and eosin. × 25.)

diagnosis of sarcoidosis is doubtful, and Small (1951) another. The evidence suggests that the risk has been exaggerated.

It is difficult to discover from most reports how often the pulmonary disease has relapsed when treatment has ceased. Michael (1951) stated unequivocally that 5 out of 5 patients reverted radiographically and symptomatically to their former state. Shulman et al. (1952) reported 10 patients with pulmonary sarcoidosis, 8 of whom improved; 5 relapsed to some extent. Some of these were treated again on two or three occasions, but they were not followed long enough for us to be sure of the final outcome. Lovelock and Stone (1953) report the best results, with 5 out of 6 remaining improved after several months' observation. Israel et al. (1954) report that only 8 of their 26 patients with pulmonary sarcoidosis have not relapsed. Our figures are even more disappointing, 11 of 16 patients relapsing completely within three months (tables III and IV). The rate of relapse is so high that short-term treatment offers little hope of controlling sarcoidosis. However, as our results so far have shown, more prolonged treatment is practicable and can maintain improvement. Should relapse still occur, continuous treatment will be needed by some patients.

There was a higher proportion of relapses after antibacterial treatment with cortisone than after antibacterial treatment alone. Of 12 patients who responded to streptomycin and P.A.S. 9 have had lasting radiographic improvement, whereas of 16 patients who responded to cortisone only 5 did the same. We cannot explain this unexpected difference, though there are several possible explanations. One is that the improvement of some of the patients during treatment with streptomycin and P.A.S. alone was fortuitous; we have already given reasons for believing this to be improbable. Another possible explanation is that cortisone may have had an adverse effect on the resistance of the host to the unknown cause of sarcoidosis, or on the susceptibility of the causal organism to antituberculous drugs, although its suppressive effect on the epithelioid cell follicle was dramatic.

Our experience is that the treatment of pulmonary sarcoidosis is still unsatisfactory, partly because of the difficulty of deciding when it should be given and partly because of its restricted value. We consider that patients whose sarcoidosis is recent and symptoms are minor can usually be observed with safety because many will improve spontaneously within a year. If, however, there is no radiographic improvement by then, there is less prospect of natural remission; so our practice now is to begin treatment about this time. We use streptomycin with P.A.S. or isoniazid for three months, continuing subsequently as long as there is radiographic response. If there is no improvement in three months, we consider whether to give cortisone as well. The long period during which it may be necessary to give it, and the consequent inconvenience, demand that cortisone should be used only when there is a real need to control progressive changes in the lungs, eyes, or elsewhere. A dosage of 100–150 mg. daily is usually sufficient. After one to two months this dosage is steadily reduced until the minimal effective dosage is found. This treatment is then continued for at least a year. Cortisone is also used initially for patients whose disease, when first seen, is already severe and therefore more likely to have a bad prognosis. When the sarcoidosis is extensive and of long standing, with much fibrosis, neither form of treatment is likely to be of use.

Summary

Pulmonary sarcoidosis was treated with streptomycin and P.A.S. (30 cases) and with cortisone in addition (20 cases).

Patients whose disease had been present for more than two years seldom improved (1 in 9) during treatment with streptomycin and P.A.S., whereas those with a shorter history often improved (11 in 21). The time of onset of radiographic improvement and of its greatest extent was similar to that of chronic pulmonary tuberculosis treated in the same way. 3 of the 12 who responded to treatment relapsed subsequently.

When cortisone was given as well, 17 of 20 patients improved radiographically. Regression of sarcoid follicles in the liver was seen in 8 patients who had serial biopsies. Improvement took place more rapidly than that from streptomycin and was also more frequent and more complete among those with recent disease. After treatment 11 patients relapsed completely and 4 partially. Prolonged treatment up to a year was found to be safe and effective.

We are much indebted to colleagues who referred patients to our care and to Prof. H. A. Magnus and Dr. J. Clegg for their advice and for technical help with the morbid histology. We wish to thank the Medical Research Council for some of the supplies of cortisone; Dr. F. J. Prime for making and interpreting investigations of lung function; and Dr. L. G. Blair for independent assessment of the radiographs. Some of our expenses were defrayed by a grant from the research fund of King's College Hospital, and one of us (J. D.) was in receipt of a personal grant from the research fund of Brompton Hospital.

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SPASTIC PARAPLEGIA OF MIDDLE AGE*

A CLINICOPATHOLOGICAL STUDY

JOHN MARSHALL
M.D. Manc., M.R.C.P., D.P.M.
SENIOR LECTURER IN NEUROLOGY, UNIVERSITY OF EDINBURGH; CONSULTANT NEUROLOGIST, SOUTH-EASTERN REGIONAL HOSPITAL BOARD; ASSOCIATE NEUROLOGIST, ROYAL INFIRMARY, EDINBURGH

MIDDLE-AGED patients with spastic paraplegia which has come on gradually and has progressed slowly are commonly seen in neurological clinics, and may present a difficult diagnostic problem. A carefully recorded history and complete examination, combined with ancillary investigations, often give a clue to the underlying lesion. Thus, there may have been an episode of diplopia in the past; or the illness diagnosed as "a chill on the kidneys" may, on closer questioning, be revealed as a neurogenic disturbance of the bladder. But not infrequently the pathological diagnosis remains obscure.

* Honyman Gillespie lecture given at the University of Edinburgh, Nov. 18, 1954.

Some idea of this difficulty is given by the different diagnostic fashions which have prevailed from time to time. Thus, in the 1870s and 1880s primary lateral sclerosis was the favourite diagnosis; but in 1892 Erb described syphilitic paraplegia which then took pride of place. Then at the turn of the century Russell et al. (1900) described subacute combined degeneration of the cord, which became the popular diagnosis, but in turn was replaced about 1910 by disseminated sclerosis. Later, with the rise of neurosurgery, every case of spastic paraplegia became a tumour suspect. The present time is not without its fashion also, for some observers now regard all these patients as suffering from cervical spondylosis, which can be demonstrated all too readily in radiographs of the cervical spine in this age-group.

These difficulties have led to the recognition of a group of cases termed "spastic paraplegia of uncertain ætiology," which is discussed here. Little is known about the natural history of this condition. What becomes of these patients? How long do they live? How many die with the disorder still undiagnosed, and how many with the passage of years develop symptoms or signs which enable a pathological diagnosis to be made?

In the early stages of the disease these patients are usually seen in a neurological clinic, and for a time they may be followed up. But with the passage of months or years they are either lost from the follow-up or, as walking becomes more difficult for them, they cease to attend. They then find their way to the chronic wards of general hospitals or to homes for incurables; or else they remain at home under the care of their general practitioner, being nursed by the district nurse or by relatives. So those who see them in the early stages of the illness never know the outcome, and those who care for them in the latter part of the illness have often little interest in its onset and development. It is hardly surprising that post-mortem examinations are few and far between.

Criteria and Material

In dealing with a condition so vaguely defined as this, it was necessary to adopt criteria to determine which cases should come under the heading of spastic paraplegia of uncertain ætiology. Arbitrarily, it was decided that the paraplegia must appear after the age of 20, and be of gradual onset and slow progression. Thus acute paraplegia from any cause and congenital paraplegia were excluded. Bilateral extensor plantar responses were a sine qua non for the diagnosis. Further signs of pyramidal defect, and also sensory loss and sphincter disturbance, might or might not be present. Pyramidal signs in the arms did not exclude the case from the series; but cases were excluded in which there was evidence of a lower-motor-neurone lesion in the upper or lower limbs, sensory loss in the arms indicative of a root lesion, or any indication that the cranial nerves were involved.

An attempt was made to overcome the difficulties of follow-up by culling the material from two sources:

1. The first source consisted of the records of all the patients who had been under the care of Dr. Arnold Carmichael at the National Hospital, Queen Square, between 1930 and June, 1952. From this source 80 cases were found that fulfilled the criteria.

2. The second source was the records of post-mortem examinations at the National Hospital, Queen Square, from the years 1928 to June 1952. These records were searched, and a list made of all the patients who had died from any disease that might have conceivably presented at some time as spastic paraplegia. The clinical records of these patients were then studied, and if in fact they had presented as spastic paraplegia of uncertain ætiology at one stage in their clinical history they were included in the study. 35 cases were obtained from this source.

By this method, therefore, 80 cases whose natural history might be followed, and 35 cases in which the patient had died but whose clinical history was available, were obtained.

Findings

This study had three aims. The first was to discover the natural history of spastic paraplegia appearing for the first time in adult life. The second was to ascertain, as far as possible, the underlying pathological processes. The third was to endeavour to establish criteria which might facilitate prompt recognition of the cause of the paraplegia.

CLINICAL SERIES

The 80 cases from Dr. Carmichael's records (the "clinical" series) were followed up as follows:

Seen personally	46
Information obtained by post	6
Dead	9
Untraced	19

9 patients had died; but post-mortem examination had been done in only 1 case.

This examination was made on the instructions of a coroner. The pathologist confined his attention to the thoracic and abdominal viscera, establishing a diagnosis of coronary occlusion; but the brain and spinal cord were not removed.

The average age of the 52 traced survivors when their symptoms first appeared had been 40 years, though there was rather a wide scatter from 20 to 70 years. At the time of the follow-up the average duration of the illness was 10·4 years; the shortest duration was 1 year and the longest 40 years. In a majority the duration was over 5 years, which clearly confirms that this is indeed a chronic condition.

TABLE I—DIAGNOSIS IN 52 CASES STILL ALIVE

Diagnosis	No. of cases
Disseminated sclerosis	10
Tumour	7
Prolapsed disc	3
Syringomyelia	1
Cervical-cord lesion	2
Paraplegia with dementia	4
Unknown ætiology	25

When these 52 patients were re-examined it became clear that they could be divided into two groups: (1) 27 in whom, with the passage of time, the diagnosis had become apparent; and (2) 25 in whom the diagnosis was still obscure (table I).

Manifest Causes

The following is a case, in the first of these two groups, in which disseminated sclerosis became manifest.

A young woman, aged 24, began to have hesitancy of micturition, followed a year later by weakness of the legs with stiffness, which slowly progressed. She had no remissions, and her symptoms became steadily worse. Eight years after the onset she was admitted to the National Hospital, under the care of Dr. Carmichael; but, despite most careful observation, the cause of the spastic paraplegia could not be detected. Investigations included radiography of the spine, examination of the cerebrospinal fluid, and myelography, all of which revealed no abnormality. She was re-examined some three years later, by which time she was very euphoric and had developed severe dysarthria. There was bilateral intention tremor in the hands; and, in addition to the spastic paraplegia, she had lost vibration and position sense in both feet and was grossly ataxic. Thus in the tenth and eleventh years of her illness this patient quickly developed widespread signs which, for the first time, clearly indicated disseminate lesions.

In the following case signs of syringomyelia appeared.

The patient, when aged 55, began to have stiffness and weakness of the legs, and on examination two years later he had a moderately severe spastic paraplegia with only slight impairment of vibration sense and no other sensory loss. Thirteen years later, he was bedridden because of the paraplegia, and had also typical dissociated sensory loss from

TABLE II—POST-MORTEM DIAGNOSIS IN 35 CASES

Diagnosis	No. of cases
Disseminated sclerosis	12
Tumour	11
Prolapsed disc	2
Syringomyelia	3
Paget's disease	1
Subacute osteitis	1
Spinal deformity (non-tuberculous)	2
Hypertrophic pachymeningitis	1
Aneurysm of intervertebral artery	1
Defect in anterior spinal artery	1

the trigeminal area to the second thoracic dermatome on the left, and from the second cervical to the first thoracic dermatome on the right.

In 4 patients dementia developed after paraplegia. Paraplegia developing consecutively with dementia has been well known since Lhermitte's (1907) description of *la paraplegie des vieillards*. Moreover, dementia followed by paraplegia is a not uncommon sequence. The present group is unusual in that the paraplegia preceded the dementia by a very long time; the shortest interval was 7 years and the longest 16 years. The clinical picture in these cases was also remarkably uniform.

The paraplegia appeared in the 5th decade and the dementia in the 6th. The paraplegia was predominantly motor, sensory loss being confined to slight impairment of vibration sense; and the dementia had the same features in all 4 patients, affecting mainly the intellectual aspects of mental life and sparing the affective. In the 3 patients submitted to pneumoencephalography symmetrical dilatation of the lateral ventricles with enlarged cortical sulci was found.

Possibly these were simply cases of spastic paraplegia in which dementia happened to develop, but the incidence of 4 cases in a series of 52—that is, about 8%—suggests that this condition may be a nosological entity. If so, the paraplegia was possibly due to a degenerative lesion of the paracentral lobules of the cerebral hemispheres, and in time the degenerative process spread beyond the lobules to involve the whole of the cerebral hemispheres, giving the eventual picture of paraplegia and dementia. But since none of these cases have been examined post mortem the nosology is still uncertain.

Cause Unknown

In the 25 cases where the diagnosis remained obscure the average duration of the disease was 13 years, compared with 10 years for the whole clinical series. In this group the disease had progressed slowly and relentlessly until, at the time of follow-up, over a quarter of them were either bedridden or reduced to a wheel-chair life. The remainder got around with difficulty on sticks.

The most protracted case illustrates strikingly how chronic the condition could be without a diagnosis ever being reached.

This man first noticed dragging of his left leg in 1912, when he was 31 years of age, followed 9 months later by a similar dragging of his right leg. The symptoms progressed slowly over the years, and in 1930, at one of many examinations, he had severe motor paraplegia with no vestige of sensory loss, normal radiographs of the spine, and normal cerebrospinal fluid. He was examined in the course of this study 22 years later, when he was 71 years old. He had complete motor paraplegia, but could feel the lightest nylon thread or faintest pinprick on his toes, though he had lost vibration sense in the feet. His mental faculties were unimpaired, and his sphincters completely unaffected, and he looked as though he would continue thus for another thirty years.

The majority of these 25 patients were thoroughly reinvestigated in the course of this study, including full blood examinations, fractional gastric analyses, lumbar punctures, and radiographs of the spine; and myelography was done in 10 cases. In no case was further light thrown on the underlying lesion. It is a chastening thought that, despite our best diagnostic endeavours, half of the group of 52 patients still defied diagnosis ten or more years after the onset of the illness.

NECROPSY SERIES

The findings were much the same in the 35 cases collected from necropsy records (table II). The average age at the onset of the illness was 43, compared with 40 years in the clinical series, and the average duration of the illness at the time of death was 7 years, compared with the 10 years' duration to follow-up in the clinical series. In all respects the groups were comparable, the illness appearing in the same manner and progressing in the same way.

Not all of these cases had remained undiagnosed until after death. In about two-thirds a pathological diagnosis had been reached before death, but in the remaining third the diagnosis was spastic paraplegia of unknown ætiology until the pathologist revealed the cause of the paraplegia, which he did in every case. Nor was it only rare lesions, such as aneurysm of the intervertebral artery, that had remained undiagnosed; for half of the cases of disseminated sclerosis were not diagnosed ante mortem. This was not surprising since clinically there was nothing to indicate disseminate lesions and in 4 of the cases there was no trace of sensory impairment in the feet.

The findings in the necropsy series, therefore, accord with those in the clinical series. In round figures a third of the patients had disseminated sclerosis, and a third compression of the spinal cord from tumours or prolapsed intervertebral discs; the remaining third had a heterogeneous group of conditions, some rare. Neither subacute combined degeneration of the cord nor motor-neurone disease was found in either the post-mortem or the clinical series, probably because these conditions are more easily diagnosed even in the early stages.

Diagnosis

These two series confirm the difficulty of distinguishing disseminated sclerosis from spinal tumour. In only 1 of the 12 cases of disseminated sclerosis in the necropsy series was pain a symptom—and this was only a vague ache in the lumbar region—but pain occurred in only 7 of the 11 patients with tumours. All the patients with a tumour had a clear-cut sensory level, but 8 out of 18 patients without tumours who had sensory loss also had a sensory level. Nor did the complete absence of sensory loss exclude disseminated sclerosis; in the post-mortem group disseminated sclerosis was found in no less than 4 out of 6 cases where there had been no sensory loss. The most helpful points in the differentiation of disseminated sclerosis from spinal tumour in the early stages were: (1) the level of the protein in the cerebrospinal fluid, which was above 100 mg. per 100 ml. in all but 1 of the cases of tumour, whereas in disseminated sclerosis it was never above 60 mg. per 100 ml.; and (2) the result of myelography, which was abnormal in all the 18 patients with spinal tumour.

It seems quite clear that conditions such as disseminated sclerosis, syringomyelia, and spinal tumour can present as spastic paraplegia in the first instance, and even the most exhaustive investigations will reveal nothing further. The primary disease will sometimes declare itself sooner or later—sooner in the case of tumour, later in the case of a non-compressive lesion—but in between a third and a half the causal lesion will not be established ante mortem.

These series suggest that cervical spondylosis is an unusual cause of spastic paraplegia. Of the 87 cases in the combined clinical and post-mortem groups, only 5 were found to be due to cervical spondylosis; and of the 35 cases in the post-mortem group, where the evidence is more incontrovertible, only 2 (about 6%) were due to this cause. The post-mortem series was collected mainly during a period when there was less awareness of cervical spondylosis; but the fact that 2

examples were found at necropsy indicates that the condition was not unsought; and if spondylosis was being overlooked some cases would have remained undiagnosed, whereas a pathological diagnosis was established in every case. The incidence of radiographic evidence of cervical spondylosis in middle-aged patients who have no neurological signs is unknown, but it is apparently fairly high. When such evidence is associated with spasticity of the legs, it should not be supposed that the one disorder is necessarily the cause of the other.

Summary

52 cases of "spastic paraplegia of unknown ætiology," first examined between 1930 and 1952, were followed up. A further 35 cases were collected from necropsy records.

The findings in these two series accord with each other.

Some ten years after onset the cause of the disorder had declared itself in about half the cases; the commonest causes were disseminated sclerosis and tumour. In about a third of the cases the cause was not recognised ante mortem.

Cervical spondylosis was a rare cause of this syndrome.

I thank Dr. E. A. Carmichael for encouragement with this study and for access to his records, and Dr. J. G. Greenfield and Dr. W. Blackwood for allowing me to use their post-mortem records.

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TETRACYCLINE IN TYPHOID FEVER

KENNETH C. WATSON
M.B. Aberd.
ASSISTANT PATHOLOGIST, NATAL PROVINCIAL ADMINISTRATION, EDENDALE HOSPITAL, PIETERMARITZBURG, SOUTH AFRICA

CHLORAMPHENICOL is generally accepted as the most effective of the antibiotics used in the treatment of typhoid fever. But though usually the response is excellent, occasionally it is very disappointing: of 120 patients with typhoid whom we treated with chloramphenicol, 7% showed no apparent response or only a very slow one (Watson 1953).

We have often been able to isolate *Salmonella typhi* from blood-clots of patients undergoing treatment with chloramphenicol: in one case the organism was isolated after 22 g. had been given, and in another after 10 g. (Watson 1955). Goodpasture (1937) and Adams (1939) have shown that *S. typhi* are present in plasma-cells in intestinal and mesenteric lesions, and we believe that these intracellular forms are responsible for the transient episodes of bacteriæmia. The observations of Smith et al. (1949) on the effect of chloramphenicol on the esterase of animal mitochondria suggest that the cell wall forms a barrier which prevents the antibiotic from acting on intracellular forms.

Chloramphenicol also gives rise to a number of toxic effects, including nausea, vomiting, stomatitis, glossitis, skin rashes, and mental apathy (El Ramli 1950). In a series of 330 cases of typhoid fever reported by Marmion (1952), the incidence of toxic reactions was as high as 44%. Lately, agranulocytosis has been reported with disturbing frequency.

In view of these observations we have treated a number of cases of typhoid fever with tetracycline.

Tetracycline is chemically related to chlortetracycline (aureomycin) and to oxytetracycline (terramycin), and is usually prepared by catalytic hydrogenation of chlortetracycline (Boothe et al. 1953). Its spectrum of activity is similar to that of the two derivatives, and cross-resistance between the three antibiotics has been reported (Finland et al. 1954).

Tetracycline appears to have two advantages over the chlor- and oxy- derivatives—namely, greater penetration of body tissues (Wright et al. 1953) and a lowered incidence of toxic effects (Putnam et al. 1953). Of 118 patients treated by Finland et al. (1954) with tetracycline, 110 were free from toxic effects; 1 case developed stomatitis, and 7 had mild diarrhœa.

Case-records

The cases reported here were sporadic ones arising in an area where typhoid fever is endemic. All showed the typical clinical features of the illness.

Case 1.—A Bantu, aged 7, was admitted on the 11th day of illness. He was grossly dehydrated, with a temperature of 103°F and pulse-rate of 124 per min. *S. typhi* was isolated from blood-clot and from whole blood. Cultures of stool and urine were repeatedly negative.

Tetracycline 250 mg. 6-hourly by mouth was begun on the day of admission. The response was poor: he continued for 12 days to run a temperature of 101–103°F and there was scarcely any clinical improvement. Between the 12th and 20th days of treatment there was a slow improvement in his clinical state, but he continued to run a temperature of 99–100°F. During the 4th week improvement became more rapid, and his temperature remained normal. Tetracycline was continued for 12 days after he became afebrile.

Case 2.—A Bantu, aged 14, was admitted with 2 weeks' history of illness; his temperature was 102°F and his pulse-rate 140. *S. typhi* was cultured from both whole blood and blood-clot. Cultures of stool and urine were repeatedly negative.

Tetracycline 250 mg. 6-hourly was given from the day of admission. The temperature remained elevated for 9 days, with no clinical improvement for the 1st week, during which he was dull and apathetic. Between the 9th and 12th days the headache and anorexia which were present on admission gradually disappeared, but abdominal distension persisted for about 8 more days. He became afebrile on the 9th day and tetracycline was continued for 14 days from the day of becoming afebrile. Subsequent progress was satisfactory.

Case 3.—A Bantu female, aged 17, was admitted after 14 days' illness. She was confused and irrational. Her temperature was 101°F and her pulse-rate 100. *S. typhi* was isolated from blood-clot after 24 hours' incubation, but culture of whole blood in bile broth was sterile after 3 weeks' incubation. The cerebrospinal fluid (C.S.F.) showed no abnormality.

Tetracycline 250 mg. 6-hourly was given from the day of admission. No improvement was noted during the first 10 days. She continued to run a temperature of 99–101°F and remained disorientated, with occasional outbursts of maniacal behaviour. In view of these outbursts the C.S.F. was twice examined again, but was normal. On the 11th day of treatment she became afebrile, and her mental state improved greatly during the next 2 days. Abdominal distension persisted for a further 3–4 days. Improvement was maintained, tetracycline being given for 12 days from the day of becoming afebrile.

Case 4.—A Bantu, aged 12, was admitted on the 4th day of his illness. His main complaint was of severe frontal headache. He had a temperature of 104·8°F and a pulse-rate of 110. *S. typhi* was isolated from blood-clot after 24 hours' incubation, but whole-blood culture was sterile after 3 weeks' incubation.

Tetracycline 500 mg. 6-hourly was started on the day after admission; but for the next 5 days his condition deteriorated, with a temperature of 102°–104°F. On the 6th day it seemed unjustifiable to continue tetracycline further. Chloramphenicol was therefore given instead, 500 mg. 6-hourly. During the next 3 days there was a notable improvement, the temperature falling to normal on the 5th day of chloramphenicol treatment. Subsequent improvement was maintained; chloramphenicol was continued in the same dosage for 10 days from the day of becoming afebrile.

Case 5.—A Bantu, aged 16, was admitted in a delirious state, with a temperature of 103°F and pulse-rate of 100, probably about the 8th day of illness. *S. typhi* was isolated from blood-clot and from whole-blood culture. Cultures of stool and urine were repeatedly negative.

Tetracycline 500 mg. 6-hourly was given from the day of admission. The temperature remained elevated for a further 5 days, and during the first 4 there was no change in the clinical state. During the following week there was a slow improvement. Though this patient appeared to respond rather better than those already considered, there was no dramatic improvement such as is seen with chloramphenicol.

Case 6.—A Bantu, aged 8, was admitted extremely ill, with a temperature of 103·2°F and pulse-rate of 100. He had been ill for 7 days. *S. typhi* was isolated from blood-clot after 24 hours' incubation, but routine whole-blood culture was sterile after 3 weeks. Stool and urine cultures were repeatedly negative.

This boy was first treated for 14 days with chloramphenicol 250 mg. 6-hourly. As there was no improvement tetracycline 500 mg. 6-hourly was substituted. A very slow clinical improvement followed, but the temperature remained elevated till the 7th day of tetracycline therapy, and abdominal distension persisted for a further 3 days. Tetracycline was continued for 17 days in all.

Discussion

The cases in this series were unselected consecutive admissions to the medical wards of a general hospital. None responded to tetracycline in the way that such cases usually respond to chloramphenicol. Pyrexia persisted, on the average, for 8–9 days after the start of treatment. (In a series of 120 cases which we treated with chloramphenicol the corresponding figure was 4·1 days. El Ramli (1950) recorded 3·5 days in a series of 200 cases treated with chloramphenicol.) Clinical improvement was correspondingly poor.

These findings are not wholly unexpected, since the response of typhoid fever to chlortetracycline has also been disappointing. Werner et al. (1954) demonstrated that, in vitro, strains of *S. typhi* show somewhat similar sensitivity to chloramphenicol and to chlortetracycline, but that, in vivo, chlortetracycline is less effective They attribute this to some difference in the drug-host relationship. I have examined the in-vitro sensitivity of 20 freshly isolated strains of *S. typhi* to chloramphenicol and to tetracycline and have found almost identical minimum inhibitory concentrations.

Case 6 showed no response at all to chloramphenicol, and is similar in this respect to cases described previously (Watson 1953). The slow improvement that followed tetracycline therapy took place during the 5th week of the illness and was probably due to a host response more than to specific antibiotic therapy.

In addition to these 6 patients we have treated a chronic fæcal carrier of *S. typhi* with tetracycline, 250 mg. 6-hourly for 10 days. During this period daily stool-cultures were negative and they remained so for 7 days thereafter. Subsequently, however, they became positive again.

In none of the patients were any toxic effects observed, and all tolerated the drug well. But small though the series is, the results suggest that tetracycline is not a suitable substitute for chloramphenicol in the treatment of typhoid fever.

Summary

Six patients with typhoid fever were treated with tetracycline. The response observed was poor, and for the treatment of this disease tetracycline seems to be considerably less useful than chloramphenicol.

I wish to thank Dr. J. Parker, medical superintendent, of Edendale Hospital, for permission to publish these case-notes. The tetracycline was supplied by Messrs. Lederle.

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PATTERN OF THE HUMAN TONGUE

BERNARD T. SQUIRES
D.M. Oxfd
MEDICAL OFFICER, BECHUANALAND PROTECTORATE, SOUTH AFRICA

ALTHOUGH the tongue lends itself readily to observation, as is evident from the antiquity of the custom of inspection of the tongue in clinical medicine, little work seems to have been published on the finer details of the tongue's surface, as seen in health and disease. Indeed it was not until modern investigation of nutrition showed that the lingual mucosa undergoes well-marked changes in nutritional deficiency that attention was drawn to the mucosal pattern and to the devising of methods for recording it.

This paper deals with the tongue pattern found by investigation of 1098 apparently healthy persons of European, Tswana, Hottentot, Swazi, or Bushman origin. Of these, 822 were Tswana (indigenous inhabitants of the Bechuanaland Protectorate), 90 Europeans residing in the Protectorate, 82 Hottentots from Kaartlwe, Bechuanaland Protectorate (one of the very few remaining Hottentot settlements), 79 Swazis from the Mbabane district of Swaziland, and 25 Bushmen from the Southern Kalahari.

The tongue pattern is due to three anatomical components on the anterior two-thirds of the lingual dorsum (which region alone can be recorded by the method used): the filiform papillæ, the fungiform papillæ, and the mucosal fissures. The papillæ are projections of the corium. The filiform papillæ are thickly distributed over the dorsum; the fungiform papillæ, larger than the filiform, are found at the sides and apices of all tongues, and in many tongues they are also spread more or less thickly over the anterior two-thirds of the dorsum. The fissures of the mucosa vary greatly in number, most tongues showing none, whereas in a small proportion the entire surface may be covered with fissures of different sizes.

Method

Photography seems to have been the first method used for recording the features of the tongue's surface; but it is expensive, needs skill, and does not provide easily decipherable records of the anatomical features of the tongue mentioned above.

Other published methods involve the use of smoked paper (Oatway and Middleton 1932). Such records, unless treated with a preservative—e.g., shellac—are not permanent.

Di Palma (1946) described a method by which prints of the tongue's surface are taken with a special ink. The method has been modified and a full account of the technique published elsewhere (Squires 1953). It need only be said here that the ink, the essential ingredient of which is Evans-blue, is applied to the extruded tongue with a squeegee or a piece of gauze, and impressions are taken by pressing a piece of glazed paper on the tongue. Once the impressions are dry—i.e., after a minute or two—they are permanent. Correctly produced prints emphasise the components of the tongue pattern in detail such as cannot be obtained by photography.

Discussion

In healthy people the filiform papillæ appear on the print as round or star-shaped dots; the fungiform papillæ, which, being smooth, pick up little ink, and that only on the sides and lateral crevices, show up as round "cheese-holes." The fissures pick up no ink, and are seen in outline only.

On examination of large numbers of prints it becomes obvious that certain characteristics of the patterns are sufficiently constant to permit type grouping. Di Palma

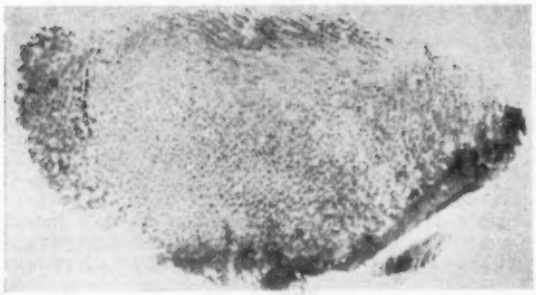

Fig. 1—Filiform type.

(1946) gave a list of five types of tongue pattern with one dominant feature and five further types with a secondary feature. He provided, however, no criteria for distinguishing each of these groups. It has been found possible to classify the present series into four groups, each exhibiting only one dominant feature which is easily recognised. The classification is reasonably clear-cut, and there is little overlapping or ambiguity.

The groups are classified as follows :

(1) *Filiform* (fig. 1), in which the filiform papillæ are uniformly and densely distributed all over the dorsum save at the apex and sides, which are occupied by fungiform papillæ.

(2) *Fungiform* (fig. 2), in which the fungiform papillæ, besides being present at the apex and sides, appear plentifully over the dorsum. The criterion of a fungiform tongue is that the papillæ must be uniformly and thickly scattered over the dorsum, because most tongues of any group will show a few isolated fungiform papillæ among the filiform.

TABLE I—DISTRIBUTION OF TYPE GROUPS IN WHOLE SERIES (1098)

Filiform	Fungiform	Linear	Fissured
831 (76%)	205 (19%)	43 (4%)	19 (2%)

(3) *Linear* (fig. 3), in which a linear arrangement of the filiform papillæ predominates.

(4) *Fissured* (fig. 4), in which well-marked fissures occur. The so-called " scrotal " tongues are included in this group. It is to be noted that one central fissure extending down the midline, which may occur naturally or else be caused by contraction of the tongue during the process of taking off a print, is not sufficient to include the tongue in this class.

Table I indicates the frequency of occurrence of the various groups in the complete series of 1098 persons.

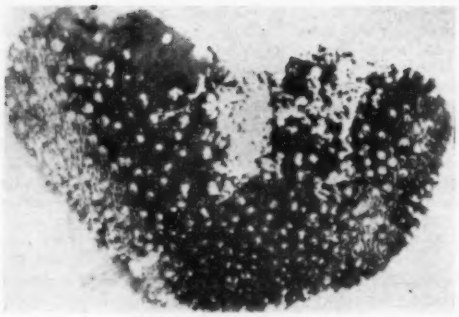

Fig. 2—Fungiform type.

It will be noted that group (1), the filiform, predominates and includes three-quarters of the series.

The patterns appear to be constant for any given healthy person. According to Di Palma (1946) no two tongues give the same pattern ; this finding has been confirmed for the present series, which included the patterns of a pair of identical twins. These were dissimilar, although of the same type.

Certain systemic diseases (e.g., cardiac and nephritic œdema) can obliterate the pattern by causing swelling of the tongue ; and chronic cachexial conditions (e.g., pulmonary tuberculosis) can cause denudation of the tongue and consequent disappearance of the pattern, probably by upsetting epithelial metabolism.

The effect of nutritional deficiencies on the pattern has been dealt with in detail elsewhere (Squires 1953). It will suffice to remark here that during the course of such disorders the filiform papillæ tend to disappear, and at a more advanced stage the mucosa becomes disorganised, giving rise to the well-known smooth tongue. Provided that the deficiency has not lasted too long, the tongue changes are reversible, and tongue prints can be used for following the regeneration of the mucosa. Fig. 5 shows the pattern of an African adolescent after a few months' moderately severe food shortage, and fig. 6 the pattern of the same tongue about seven months later, after a good crop season.

Finally, there are some indications of racial variation in the incidence of the types, as shown in table II, in which the Bushman sample, although very small, is included for the sake of completeness and comparison. If the Bantu (Tswana and Swazi), Hottentot, and European groups are compared, it will be seen that the difference between the incidence of fungiform tongues is impressive ; indeed, between the Bantu and European

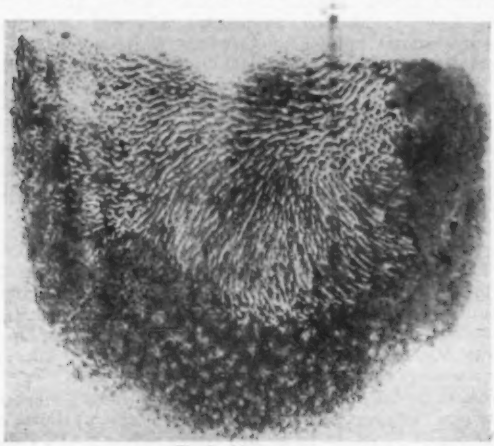

Fig. 3—Linear type.

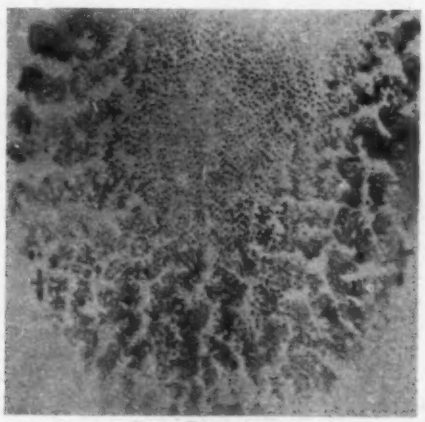

Fig. 4—Fissured type.

TABLE II—RACIAL VARIATIONS IN DISTRIBUTION OF TYPE GROUPS

Race	No.	Filiform	Fungiform	Linear	Fissured
Tswana ..	822	641 (78%)	137 (17%)	34 (4%)	10 (1%)
Swazi ..	79	62 (78%)	11 (14%)	3 (4%)	3 (4%)
Hottentot ..	82	60 (73%)	19 (23%)	2 (2%)	1 (1%)
European ..	90	57 (63%)	28 (31%)	—	5 (6%)
Bushman ..	25	11 (44%)	10 (40%)	4 (16%)	—

groups the difference is significant. (In spite of the tenfold difference in numbers between the Tswana and Swazi groups, the proportion in which the types occur is practically identical.) The proportion of filiform to fungiform tongues among the Bushmen is also interesting, but the series is far too small to justify speculation about its possible significance.

Summary

An account is given of the mucosal patterns of the healthy human tongue in 1098 persons, as recorded by an ink printing method.

The persons examined were of Tswana, European, Hottentot, Swazi, or Bushman origin.

The tongue patterns can be divided into four types: filiform, fungiform, linear, and fissured.

The filiform type accounted for over 75% in the whole series, the fungiform for 19%, the linear for 4%, and the fissured for 2%.

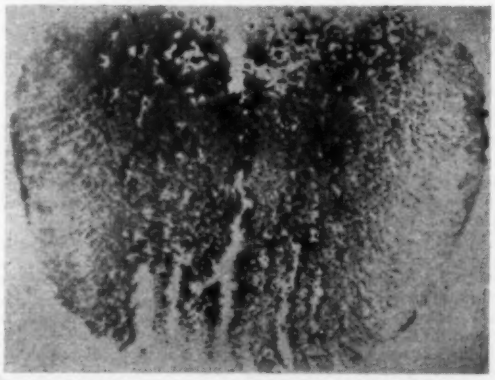

Fig. 5—Tongue pattern in chronic nutritional deficiency.

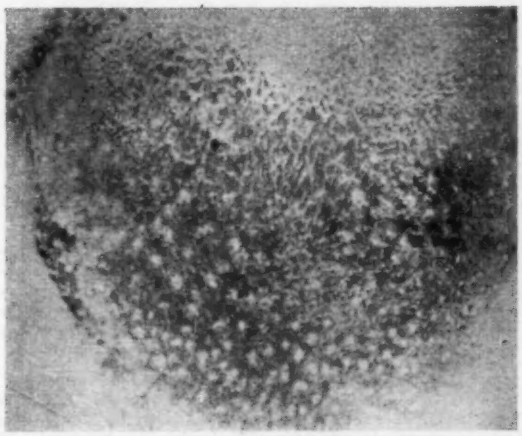

Fig. 6—Same tongue as in fig. 5, showing restoration of original pattern when nutritional deficiency has been made good.

No two tongues gave the same pattern; a pair of identical twins gave dissimilar prints, although they were of the same type.

There is some evidence of racial variation in the incidence of type grouping.

I am indebted to the acting director of medical services, Bechuanaland Protectorate, for permission to publish.

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HEPATIC ABSCESS SECONDARY TO DUODENAL ULCER

F. P. ANTIA
M.D. Bombay, M.S. Illinois, M.R.C.P.
ASSOCIATE PHYSICIAN, B.D. PETIT HOSPITAL; CONSULTING GASTRO-ENTEROLOGIST, TATA MEMORIAL HOSPITAL

FRENY MARKER
M.B. Bombay
HOUSE-PHYSICIAN, B.D. PETIT HOSPITAL

LIVER abscess caused by a penetrating duodenal ulcer is rare. Heathfield (1942) described one case (diagnosed post mortem) where the abscess followed definite perforation of an ulcer. A similar case recorded by Beaver et al. (1946) was complicated by pleural effusion, suppurative peritonitis, and thrombosis of the femoral vein. The following case, in which the abscess was produced by a peptic ulcer complicated by hæmatemesis and melæna, seems to have no reported parallel.

Case-report

A Parsee, aged 58, admitted to hospital on Jan. 28, 1954, for the past eight days had had pyrexia, anorexia, and a feeling of heaviness in the abdomen. His temperature had been observed to rise to 102°F each evening, returning to normal in the morning.

Previous History.—Two years previously the patient had had a similar bout of intermittent fever; the liver was then enlarged. He had been given injections of penicillin for fifteen days, followed by chloramphenicol and quinine for fifteen days. The pyrexia had continued, so he was investigated to exclude malignancy; this investigation proved negative. Subsequently he was given 10 tablets of chloroquine and 12 injections of emetine, and the pyrexia subsided. His liver had remained enlarged, and he had often had nausea and anorexia. He denied ever having had dysentery.

Examination.—The patient was well-built, with no evidence of jaundice. In the mornings he seemed well, but in the evenings his temperature rose to as high as 102°F and his pulse-rate to 100 per min. The respiratory, cardiovascular and central nervous systems were normal. The liver was enlarged down to the umbilicus, and was firm, smooth, and not tender. The spleen was not palpable.

Investigations.—Blood: white cells 18,500 per c.mm. (polymorphs 88%, lymphocytes 12%); red cells 3,440,000 per c.mm.; Hb 10 g. per 100 ml. Erythrocyte-sedimentation rate 28 mm. in first hour (Wintrobe). Urine investigations negative. Fæces negative. van den Bergh test negative; icteric index 4 units; serum-bilirubin 0·3 mg., serum-albumin 2·9 g., serum-globulin 2·75 g., per 100 ml. Thymol turbidity 1 unit. Alkaline phosphatase 5 units (Bodansky). Serum-cholesterol 150 mg. per 100 ml. Prothrombin-time 30 sec. (control 25 sec.); bleeding-time 2 min.; clotting-time 5 min.; platelets 370,000 per c.mm.

Fluoroscopy showed normal upper domes of the diaphragm and normal diaphragmatic movements. Radiography after barium meal showed no abnormality of the stomach and duodenum. Sigmoidoscopy revealed no abnormality up to 10 in. Peritoneoscopy on Feb. 5, to exclude malignancy of the liver, showed diffuse enlargement of the right lobe of the liver up to the umbilicus; the surface appeared smooth,

and there was definitely no evidence of malignancy or cirrhosis; the left lobe was also somewhat enlarged; the peritoneum seemed normal.

Treatment and Progress.—Amœbic abscess of the liver was tentatively diagnosed. The patient was given emetine gr. 1 and strychnine gr. $^1/_{30}$ daily for ten days, but the pyrexia persisted. Chloroquine to a total of 5·2 g. was given over twelve days, but nausea and anorexia greatly increased and his condition deteriorated. On Feb. 10 diagnostic aspiration of the liver yielded 30 ml. of greyish pus, which contained no amœbæ and was sterile on culture. On the same day administration of aureomycin was begun with 500 mg. intravenously, followed by 500 mg. by mouth six-hourly. A total of 20 g. was given. The next day the temperature fell to normal, and it did not again rise. The aureomycin rather than the aspiration must have been responsible for this dramatic improvement. The patient's appetite also improved from the next day. The liver, on the other hand, did not diminish appreciably in size, and drainage of the abscess was proposed. But the patient felt so well that he requested his discharge, promising to return within a fortnight for the operation.

Readmission.—The patient returned on March 6 complaining that the previous night he had passed a dark stool and vomited a few ounces of partly clotted blood. Blood: white cells 10,000 per c.mm. (polymorphs 92%, lymphocytes 8%); red cells 3,780,000 per c.mm.; Hb 9·5 g. per 100 ml. The liver-function tests were normal as before. Liver-biopsy on March 10 showed normal pattern. The patient continued having tarry stools practically every day, with occasional hæmatemeses. He was given one or more blood-transfusions every day, according to the severity of bleeding; but his condition became very low. On March 21, 1954, he was operated on.

Drainage (Mr. M. P. Mehta).—The liver abscess was opened under local anæsthesia. Greyish necrotic material and massive blood-clots were evacuated. In view of the patient's feeble condition no further exploration was made. A drainage tube was left in the abdomen. Biopsy of the abscess cavity showed "fibrous tissue infiltrated by acute inflammatory cells. No evidence of amœbic infection."

Progress.—The abscess cavity continued to ooze blood in large quantities from the drainage tube, but the hæmatemesis and melæna stopped. On March 26, however, he again had hæmatemesis and melæna, and he was maintained mainly on blood-transfusions. By now the oozing from the wound had stopped. 36 transfusions were given in all. On April 8, after the patient had bled for well over a month, laparotomy was done as a last resort.

Laparotomy (Mr. M. P. Mehta and Mr. R. J. Maneckshah).—The stomach was distended. The anterior surface of the first part of the duodenum was adherent to the liver. After separation of the adhesions a large penetrating ulcer of the first part of the duodenum, about $1^1/_2$ in. in diameter, was found to be penetrating the right lobe of the liver. The ulcer was mobilised and buried, and a posterior gastro-enterostomy was done.

Progress.—Thereafter the patient improved, and in about four days melæna disappeared. He was discharged on May 16, 1954. When he was last seen on Nov. 3 the liver was not enlarged.

Discussion

Peptic ulcer as the cause of the bleeding was quite unforeseen, since repeated questioning had failed to elicit any previous history of hunger pain or dyspepsia, and radiography after a barium meal had been negative. In any case, the patient's feeble condition militated against surgical operation—though laparotomy was eventually done as a last resort. The massive blood-clots in the abscess cavity came from the ulcer, from which blood continued to ooze in large quantities through the drainage tube inserted into the abscess cavity.

Summary

A duodenal ulcer in a 58-year-old man penetrated the liver, causing hepatic abscess. The patient also had hæmatemesis and melæna, but the diagnosis was in doubt until laparotomy was undertaken. Recovery followed gastro-enterostomy.

I am grateful to the superintendent, B.D. Petit Hospital, for permission to publish this case, and to Mr. M. P. Mehta and Mr. R. J. Maneckshah for the operations.

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OPTIC ATROPHY AFTER ADMINISTRATION OF ISONIAZID WITH P.A.S.

P. H. SUTTON
B.Sc., M.D. Lond., M.R.C.P.
CONSULTANT CHEST PHYSICIAN, NORWICH AREA

P. H. BEATTIE
M.D. Aberd., D.O.M.S.
OPHTHALMIC SURGEON, NORFOLK AND NORWICH HOSPITAL

WE report the following case in the hope that any similar complaint will be treated with respect if it should be observed by a physician using isoniazid.

The patient, now aged 35, was a prisoner-of-war in Japanese hands for three and a half years, and had beriberi and right foot-drop. On release his vision was normal and he had no ocular symptoms, but he was suspected to have pulmonary tuberculosis. No evidence of activity was discovered till 1950, when his sputum became positive. Cavitation persisted in spite of sanatorium treatment; he refused thoracoplasty.

In 1953 a pneumoperitoneum was induced, and a course of streptomycin 1 g. twice weekly and *p*-aminosalicylic acid (P.A.S.) 20 g. a day was given for two months. There was some improvement, and a further two-month course of P.A.S. 15 g. a day and isoniazid 200 mg. a day was started on Feb. 2, 1954, as outpatient treatment. Nine or ten days afterwards he developed a pain in the mid-frontal area and noticed that his vision was becoming poorer. The visual disturbance increased in severity, his vision reaching its lowest ebb about March 25, just before the course of isoniazid and P.A.S. was completed.

On April 8, 1954, when he was first sent to the eye department of the Norfolk and Norwich Hospital, his visual acuity was 2/60 in the right eye, and 6/60 in the left eye. Correction of the trifling refractive error made no significant improvement. He could not even read large type. Both fundi were normal, and the peripheral fields of vision were full. There was no history to suggest any demyelinating disease, and no family history of Leber's optic atrophy or other hereditary type of degeneration. The Wassermann reaction was negative, and the blood picture was normal. Radiography of the skull showed no abnormality in the pituitary fossa or in the optic foramina. Toxic neuritis due to nicotinic acid was tentatively diagnosed.

The patient was examined again on June 24, when bilateral optic atrophy had developed, but his visual acuity had not altered. No other fundus changes were observed. A general medical examination revealed no associated neurological signs. He has since been kept under continuous observation, but no significant change in his vision has developed. The discs now show a pearly white optic atrophy. His standard of visual acuity is 4/60 in the right eye and 3/60 in the left. With a telescopic lens for his right eye he can manage with difficulty to read J6 in a good light.

The significant feature here is that the patient noticed deterioration in his vision about ten days after the course of drugs had been started, and complained about it to one of us (P. H. S.). Visual disturbance had not hitherto been reported as a complication of this treatment, and his complaints were not considered to be relevant.

The tolerance of P.A.S. in the previous course of treatment, as well as the absence of reports that it is neurotoxic, seem to exculpate this drug. There have been frequent reports of toxic neuritis due to isoniazid, but not in the dosage used in the present case and never

of the optic nerves. There therefore seems to be some idiosyncrasy present in this patient, because it seems unlikely that his past nutritional disease should be important at this late stage.

We are indebted to Dr. Kenneth Latter for the general examination of this patient.

POLIOMYELITIS NEONATORUM

W. F. TWINING McMATH
M.D. Belf., M.R.C.P., D.P.H.
PHYSICIAN-SUPERINTENDENT, NEASDEN HOSPITAL, LONDON

PARALYTIC poliomyelitis neonatorum is a rare disease. Severin (1939) found that of some 18,000 recorded cases of poliomyelitis, only 22 began in the first month of life. Shelokov and Weinstein (1951) cite Aycock as having seen a case in an infant only two days old. Apparently the youngest patient referred to in the Bibliography of Infantile Paralysis (1951) is the 4-day-old baby described by Frøvig (1947):

"The four members of one family having poliomyelitis during the same epidemic included a mother aged 20, and her newborn child. The mother apparently acquired the disease in the last days of pregnancy . . . the infant developed symptoms on the fourth day, and four days later could not move arms, legs or head."

In the following case symptoms of poliomyelitis appeared in a newborn infant at about the tenth day of life.

On Sept. 25, 1954, a female infant, aged 16 days, was admitted to hospital for investigation. The mother's pregnancy and delivery had been normal, and there had been no birth trauma. The baby was breast-fed and sucked well until the tenth day, when the mother began to have great difficulty in waking her for feeds. This continued until the thirteenth day, when the child was noticed to have paralysis of the left arm and shoulder.

On admission, the infant's temperature was 97·8°F. The cerebrospinal fluid contained 100 lymphocytes per c.mm., 140 mg. protein per 100 ml., and 35 mg. sugar per 100 ml. White cells in the blood numbered 8000 per c.mm.; the differential count was normal. The infant had a complete flaccid paralysis of the flexors and extensors of the neck, of the left shoulder-girdle, and of the upper arm. Paralysis of the wrist and hand was less complete. With positioning and physiotherapy the movements of the wrist and hand improved, and the infant was subsequently transferred to an orthopædic unit.

Poliomyelitis virus, type I, was cultured from the fæces of both the mother and the child.

Although type-I poliomyelitis virus was isolated from the fæces of the mother as well as of the child, the mother had experienced no symptoms that could be attributed to poliomyelitis.

Most probably the contaminated fæces of the mother infected the child at the time of delivery. Where symptoms develop two to four days after birth, intra-uterine infection should be suspected, since incubation periods of less than six days are uncommon. Since infection can so easily occur during delivery, proof that intra-uterine infection can take place will be forthcoming only when the virus has been recovered from a stillborn fœtus or from an undelivered fœtus in a patient who has died of poliomyelitis.

The cerebrospinal-fluid examination immediately before admission was carried out in Dr. G. Discombe's department at the Central Middlesex Hospital. Dr. A. P. Goffe, of the virus reference laboratory, Colindale, carried out the virus studies.

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Preliminary Communication

TECHNIQUE FOR DEMONSTRATING NEUROSECRETORY MATERIAL IN THE HUMAN HYPOTHALAMUS

THE theory that the posterior-pituitary hormones are elaborated in the hypothalamus rests primarily on the demonstration in animals of an intensely staining material both in the cell-bodies of neurones of the supraoptic nucleus and along their axones as they pass down the supraopticohypophyseal tract to the posterior lobe of the pituitary.[1,2] This material was at first thought to represent the posterior-pituitary hormones themselves, but is now widely regarded as a glyco-lipo-protein bearer-substance for these hormones.[3–5] This view seems to be accepted by Barrnett,[6] who claims moreover to have shown, by means of his dihydroxy-dinaphthyl-disulphide reaction for cystine, that the posterior pituitary of some animals contains aggregations of a material probably consisting of the cystine-rich oxytocic and antidiuretic octapeptides described by Du Vigneaud et al.[7,8] and thus representing the posterior-pituitary hormones.

On the other hand, there is evidence that the material demonstrated by Bargmann is not a bearer-substance, but that, both in the hypothalamus and in the posterior

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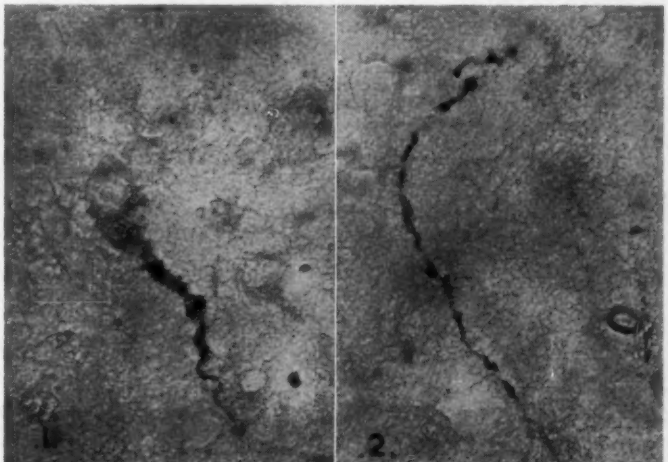

Fig. 1—Cell-body and axone of neurone in paraventricular nucleus containing abundant "neurosecretory material" (× 750).

Fig. 2—Beaded appearance of "neurosecretory material" distributed along axone in region of paraventricular nucleus (× 750).

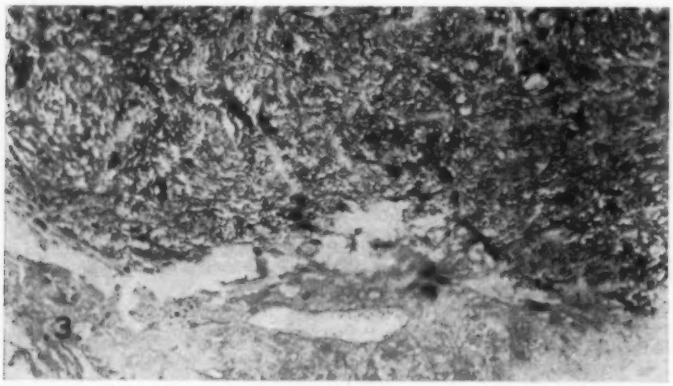

Fig. 3—Abundant "neurosecretory material" in posterior lobe of pituitary; the anterior lobe lies below (× 220).

pituitary, it is a protein or polypeptide rich in cystine—i.e., the hormone itself.[9 10] The histochemical technique on which this claim is based involves the reduction of ferric-ferricyanide (Hardy,[11] modified by Adams[12]) and depends for its specificity on the fact that, with the appropriate controls, it reacts only with high concentrations of cystine; and there is some 19% of cystine in Du Vigneaud's octapeptides. Consequently this technique has the advantage of demonstrating "neurosecretory material" but little else in the hypothalamus—a result which cannot be achieved with the far more sensitive technique employed by Barrnett, the application of which is of limited value in the hypothalamus.

The ferric-ferricyanide technique thus provides the first adequate histochemical evidence of neurosecretion in the hypothalamus. This, however, it achieves only in animals such as the cat and dog, in which there are large aggregations of "neurosecretory material" in the neurones of the supraoptic nuclei. In man this material is less conspicuous; and, moreover, we found that existing staining methods were rather unsatisfactory because of their lack of specificity.

THE NEW TECHNIQUE

We have overcome these difficulties by devising a new technique capable of being applied to paraffin-embedded formalin-fixed tissue. This involves the oxidation of tissues by performic acid, and the subsequent demonstration of sulphonate radicles derived from cystine or cysteine with 'Alcian Blue' (Imperial Chemical Industries Ltd.) at pH 0·2. The reaction is intensified if preceded by the immersion of the section in a reducing agent—e.g., sodium hydrosulphite.

MATERIAL

The human tissues examined by us were obtained at necropsies performed 4, 22, 41, 48, and 61 hours after death. The ages of the subjects (four males and one female) were 55, 64, 35, 47, and 1.

RESULTS

In the human subjects, as well as in animals (including the dog) material throughout the neurohypophysis and in the supraoptic nuclei was stained a bright blue. This reaction for reasons which will be published elsewhere we regard, with the appropriate controls, as an indication of a high content of cystine (or cysteine). Beyond occasional granules in the cell-bodies of other large neurones—e.g., in the mamillary body—there was no similar material in the nervous tissue of the hypothalamus. In the human subjects, the material was aggregated in the cell bodies of the neurones of the supraoptic and paraventricular nuclei, and spread down their axones (fig. 1); it was also present in the form of characteristic "beaded fibres" (fig. 2) in the supraopticohypophyseal tract, and it filled the posterior lobe of the pituitary (fig. 3).

Because of its distribution and high content of cystine, this material may reasonably be identified with posterior-pituitary hormone; its histochemical localisation in the human hypothalamus strongly confirms the hypothesis (hitherto based on the study of material from animals) that the posterior-pituitary hormones are elaborated in the hypothalamus. The performic-acid alcian-blue technique should therefore be of great value in the investigation of hypothalamic disturbances in man.

C. W. M. ADAMS
M.B. Camb.

Department of Pathology,
The London Hospital,
London, E.1

J. C. SLOPER
M.D. Camb., M.R.C.P.

9. Sloper, J. C. *J. Anat., Lond.* 1954, **88**, 576.
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12. Adams, C. W. M. To be published.

Medical Societies

ROYAL SOCIETY OF MEDICINE

Toxoplasmosis

A JOINT meeting of the sections of pathology and comparative medicine was held on March 16 under the chairmanship of Prof. L. P. GARROD, president of the pathology section.

Prof. CHRISTIAN SIIM (Copenhagen) described his experience of toxoplasmosis in Denmark. He pointed out that it was easy for specimens from any part of that small country to be sent to the State Serum Institute, and it was also easy for the pathologist to see personally cases in any part of the country. In the diagnosis of the disease, morphology alone was not to be relied on; attempts to isolate and maintain the toxoplasma by infecting mice often failed. Serological tests were of great value in diagnosis; he used both the dye test and the complement-fixation test. Toxoplasmosis was widespread in the animal kingdom. 10% of hares had been found to be infected with strains of toxoplasma identical with those found in patients, and it occurred in other species of animals. The mode of spread was uncertain. Food—for example, raw milk or raw meat—was an obvious possible route, and blood-sucking insects had also to be considered. It was difficult to estimate the frequency of toxoplasmosis. In some practices in Denmark 1 or 2 cases were recognised in every 2000 patients per year. The disease appeared as congenital or acquired; and there were 3 clinical syndromes—lymphadenopathic, exanthematous, and encephalitic.

Prof. C. P. BEATTIE dealt mainly with epidemiology. He mentioned a case of laboratory infection which he and his colleagues had recently reported, and he discussed other such cases, some fatal. The epidemiology of toxoplasmosis had some peculiar features. The parasite knew no boundaries of zoology or geography. Infection could be transmitted through the placenta, yet it was difficult to infect mice by mouth. Bites, skin scratches, and vaginal and tracheal mucous membranes seemed to be common avenues of infection. Infection was rather common in veterinary surgeons and animal-house attendants. The picture was of a widely spread parasite

which often reached a state of convenient symbiosis with a host, human or animal, and rarely caused serious trouble. The mechanism of resistance to clinical infection was far from clear. A mother might perhaps have come to terms with the parasite but the fœtus could be heavily infected, as in congenital toxoplasmosis. The presence of other disease sometimes seemed to activate the infection—for example, in dogs suffering from distemper. The rôle of antibodies was not clear—infection with toxoplasma did not necessarily cause disease.

Dr. I. A. B. CATHIE discussed mainly laboratory diagnosis. Mouse passage was the most direct, and in his hands had been a successful, method of diagnosis. Other tests of value were the rabbit skin neutralisation test, the toxoplasmin skin sensitivity test, the dye test, and the complement-fixation test. The last two were the most commonly used; but neither was entirely specific, and they must be interpreted cautiously. He regarded a serum titre of over 1/100 with the dye test, together with a complement-fixation titre of over 1/8, as indicating probably an active infection. Practically all the tests now used were done with Sabin's original strain of toxoplasma, and the validity of any tests in which this strain was used clearly depended on the correctness of Sabin's original identification of his strain as a toxoplasma.

Reviews of Books

Clinical Bacteriology

E. JOAN STOKES, M.B., M.R.C.P., clinical bacteriologist, University College Hospital, London. London: Edward Arnold. 1955. Pp. 288. 20*s*.

AFTER the decline of vaccine therapy, diagnostic bacteriology was chiefly concerned with the detection of the specific fevers. Knowledge of bacteria and of the pathology of infectious disease increased without pause, but it was applied to preventive rather than to curative medicine. The hazards of the late war and the discovery of sulphonamides and the antibiotics have to some extent restored the importance of the subject, but it is still a neglected branch of clinical pathology too often regulated by rules of thumb (e.g., the words "pathogenic" and "saprophytic"). Meanwhile the current textbooks emphasise the systematic and epidemiological aspects of bacteriology rather than its relation to the diagnosis and cure of disease. Dr. Stokes's book is welcome because she assumes throughout that an accurate knowledge of the parasite, and the reactions of the body to its presence, is as important to the cure of the patient as it is to the progress of medicine. This is a proper antidote to the not uncommon view that there is only one question for the bacteriologist to answer—to what antibiotic is the (unnamed) organism sensitive?

The greater part of the book is devoted to the practical conduct of the bacteriological laboratory. The subject allows no entirely logical arrangement and is considered both in relation to the specimen to be examined and the organism to be identified. Few of the methods have not been published elsewhere (and there may be better ones than some of these); but this is the first time, we believe, that they have been set down in an orderly fashion between two covers and carrying the hallmark of personal experience. Methods alone are, of course, not enough; and there is much wisdom in the hints upon the interpretation of findings and the commoner pitfalls. We set the book several problems of a kind likely to arise in any laboratory, and to each it offered a reasonable solution.

Besides diagnostic bacteriology proper it includes sections upon other tasks which come to the hospital laboratory—the assay of antibiotics, the testing of sterility, and hospital epidemiology. There are some omissions; and very properly no mention is made of diseases alien to this country. The section on mycology should be expanded or omitted. There is a certain faddiness in method which experience will forget without loss. The advice on note-keeping may seem to aim high; but the recommended method is less formidable than it seems.

All in all, this is the most valuable book for the clinical laboratory which has appeared for a long time, and it is to be hoped that the introduction will not remain unread. The failings of diagnostic bacteriology have not been those of method but of failure to realise the purpose, logic, and limitations of the methods. Its results can seldom be stated in absolute numerical values of defined entities. They are, like the report of the histologist or the bedside diagnosis, personal opinions on complicated biological problems, based on observation and illuminated by experience. The precepts of this book should go a long way to improve the shoddy standards, intellectual as well as technical, which are obvious in only too many laboratories.

Clinical Physiology of the Lungs

CECIL K. DRINKER, M.D., D.SC., formerly professor of physiology, Harvard University School of Public Health, Boston, Mass. Springfield, Ill.: Charles C. Thomas. Oxford: Blackwell Scientific Publications. 1954. Pp. 84. 40*s*.

The Auxiliary Heart

WILLIAM WALTER WASSON, M.D. Springfield, Ill.: Charles C. Thomas. Oxford: Blackwell Scientific Publications. 1954. Pp. 184. 75*s*.

IN both these monographs the authors are dealing chiefly with the pulmonary circulation and allied factors, such as elasticity of the lungs. An analysis of blood-flow through the lungs shows that the dynamics of the chest play a considerable part in maintaining the circulation. For example, the alteration in pleural pressure in respiration sucks blood into the great veins and acts as an accessory or auxiliary heart, and changes in pressure within the air passages referred to the pulmonary capillaries vary the flow. Figures make clear the importance of this aspect of chest physiology. For instance, the 700 million air sacs have an alveolar surface of 50–100 square metres, and in a normal-sized man between a tenth and a sixth of the blood-volume is contained in the pulmonary arteries and veins. 3–5 litres passes through the lung capillaries each minute at rest, but the figure may rise dramatically to 20 litres during hard exercise.

Dr. Drinker makes interesting observations on lung pathology, showing how in emphysema the huge pulmonary reservoir can retain blood where the elasticity of the alveoli and capillaries has diminished. The possibility that red blood-cells twist and bend to make their passage through the pulmonary capillaries may explain why with an obstruction to the lung circulation the cells may pile up and produce an infarct. Dr. Wasson points out that the failure of adequate diaphragmatic movement in the fat and elderly will produce shortness of breath, pain, and cough which to some extent can be remedied by posturing the patient or by inducing a pneumoperitoneum so that the diaphragm is raised to a point of better advantage for respiratory excursion.

Both books are well illustrated and include some of Snow Miller's colour diagrams of the finer structure of the lungs. They are stimulating and valuable in emphasising the importance of an aspect of the circulation which is often overlooked.

Fluoridation as a Public Health Measure

Editor: JAMES H. SHAW, Harvard School of Dental Medicine. Washington: American Association for the Advancement of Science. London: Bailey Bros. & Swinfen. 1954. Pp. 232. 40*s*.

THIS is the third symposium in a series. The two earlier ones dealt with the natural presence of fluorine in water and described how in excess it may have a toxic effect and how in small amounts it may reduce dental caries. This third volume discusses the purposeful addition of fluorine to public water-supplies, and its 21 contributors are bound together by their common zeal for fluoridation. It appears in the middle of the controversy which crossed the Atlantic in the wake of the United Kingdom mission, and its 450-odd references offer scope for further reading. To the converted it will provide useful ammunition; to the doubters it may seem a little biased; to the opponents of fluoridation it may look like an attempt to blind with Science.

There is an interesting evaluation of vehicles other than the public water-supplies for administering fluorine to the small group of the community that need it, and a frank admission that little is known on this point, so the contentious technique of mass medication may yet be avoided by some form of voluntary dosage. The book deals with fluorine phenomena as purely scientific and engineering experiments and observations, and as such deserves respect; but the fluoridation of public water-supplies raises ethical and human problems which are not given due weight. Perhaps the next volume in the series will restore the balance.

The Development of Tropical and Subtropical Countries

With particular reference to Africa. Editor: A. LESLIE BANKS, M.A., M.D., F.R.C.P., D.P.H., barrister at law, professor of human ecology, University of Cambridge. London: Edward Arnold. 1955. Pp. 217. 18*s*.

Two years ago, with the help of the Rockefeller Foundation, Professor Banks invited a group of 32 agriculturalists, economists, educationalists, doctors, and sociologists to visit Cambridge to discuss general problems of African development and especially the importance of power and water, food and its production, health and welfare, and education. This book is a transcript of a mechanical recording of the discussions, after each contributor had made corrections. The subjects were well chosen and, as the speakers for the most part showed both knowledge and imagination, the book is lively reading. Its appeal is broad and experts in a great variety of techniques can learn from it, and the medical reader may be surprised to find how intimately the practice of curative and preventive medicine in Africa is bound up with other disciplines.

But a transcript of a symposium is never wholly satisfactory, and this one is often disjointed, seldom properly documented, and occasionally nonsense. Is it too much to hope that Professor Banks will find time over the next five years to digest and expand the excellent material collected here and give us a coherent and well-documented monograph?

Chemistry and Biology of Pteridines

A Ciba Foundation Symposium. Editors: G. E. W. WOLSTENHOLME, O.B.E., M.A., M.B.; MARGARET P. CAMERON, M.A., A.B.L.S. London: J. & A. Churchill. 1954. Pp. 425. 42*s*.

THE pteridines are related to the purines in that the basic pteridine-ring system contains one more carbon atom than that of the purine molecule. Pteridines were first discovered, some sixty-five years ago, by Sir Frederick Gowland Hopkins as pigments of butterfly wings; since then they have been found widely distributed in nature in pigments, in the vitamin folic acid, and in other forms.

The first part of this symposium, on the chemistry of pteridines, provides a lucid account of an interesting branch of heterocyclic chemistry. In the second part, which deals with the biology of pteridines, Dr. D. D. Woods gives an account of the relation of *p*-aminobenzoic acid (a sulphonamide antagonist, and constituent of the folic-acid molecule) to folic acid in micro-organisms. Three papers are concerned with the effect of pteridines in man: Dr. W. Jacobson describes the effect of the folic acid antagonist, aminopterin, on mitosis of cells in leukæmia; Dr. R. H. Girdwood discusses the relation of disorders of folic acid metabolism to anæmias; and Dr. Jacob Colsky deals with hepatic cirrhosis in children suffering from leukæmia and treated with aminopterin and amethopterin. The emphasis is chiefly on the fundamental nature and biological action of this interesting class of compounds.

Adrenal Cortex.—The Josiah Macy, jun., Foundation, New York, has published the transactions of the conference on this subject held in November, 1953. The editor is Dr. Elaine P. Ralli. (1954. Pp. 187. $3.75.)

New Inventions

AN INSTRUMENT FOR DIVIDING FLEXOR RETINACULUM

ACROPARÆSTHESIÆ involving the thumb and lateral two fingers of the hand may result from a lesion of the median nerve at the wrist—the "carpal-tunnel syndrome." McArdle[1] first attributed these acroparæsthesiæ to compression of the nerve as it runs from the wrist to the palm beneath the flexor retinaculum, and Kremer et al.[2] showed that incision of the retinaculum, by releasing the compression of the nerve, gave immediate and permanent relief of pain in most cases.

In the open operation an incision is made along the medial border of the thenar eminence up to the wrist

Fig. 1—Lateral view of retinaculotome.

and then transversely across the wrist. The retinaculum is divided under direct vision, and the median nerve inspected for pathological changes. The healing of such a wound leaves much to be desired: the scar is usually raised and tender, and may become adherent to the median nerve, with subsequent pain on movement of the hand.

The closed operation is done through a small transverse incision at the wrist. The retinaculum is opened under direct vision and an instrument—usually a bistoury—is inserted beneath its fibres to divide the ligament from the wrist to the palm. In the process of cutting the ligament the bistoury must, because of the depth of its blade, press heavily upon the median nerve, thus aggravating the condition which the operation is designed to relieve; and matters are made still worse if a guard (such as a Macdonald's dissector) is inserted beneath the bistoury.

To avoid such a danger I have designed the instrument shown in the accompanying figures. It consists essentially of a base-plate upon which, at right-angles, is set the knife-blade. The base-plate is $2^1/_4$ in. $\times$ $^1/_4$ in., a size that usually allows it to pass easily through the carpal tunnel. The handle of the base-plate is flat and set in the same plane as the knife, so that the operator can always tell the position of the knife-edge. The knife itself is set $^1/_2$ in. back from the end of the base-plate to ensure that the cut will be made along the line

Fig. 2—Base-plate of retinaculotome, from above.

of the median nerve. The knife-blade is triangular; the small cutting side is only $^1/_8$ in. high and has a slightly concave border. The back of the blade is rounded to prevent damage to the overlying tissues. The retinaculotome cuts more readily if the incision of the ligament is begun with a pair of scissors. The blade should be kept very sharp with a small emery stone.

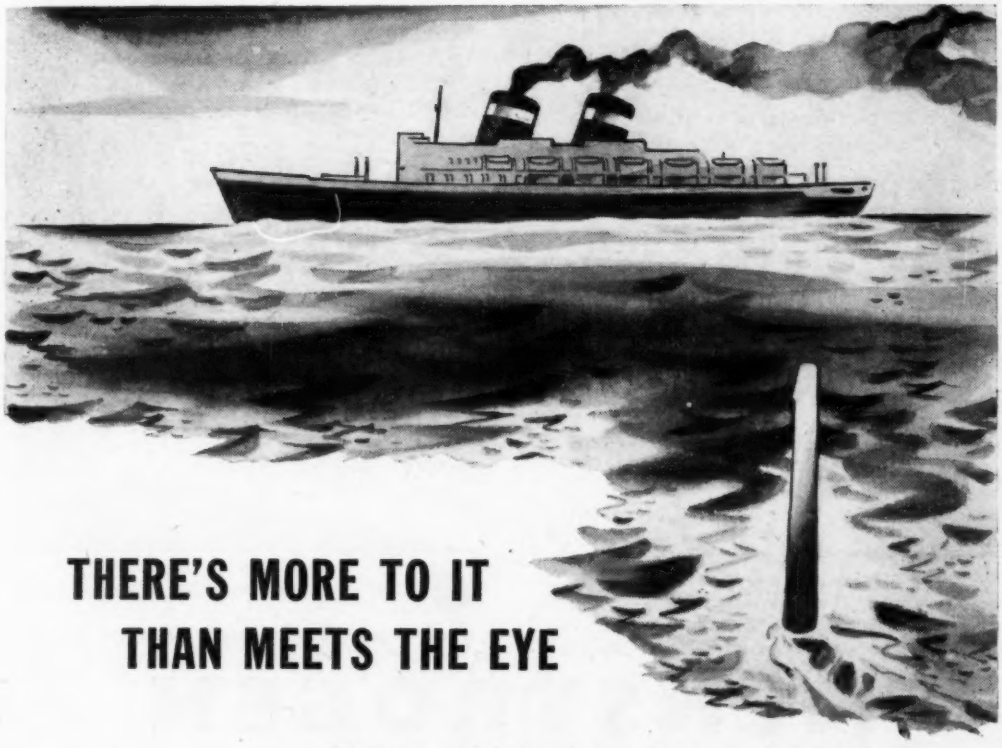
I have used the instrument in 15 cases without any difficulty or mishap. The immediate results of operation are as good as with conventional methods of dividing the ligament. Where the carpal tunnel is exceedingly narrow the instrument cannot be used, but in these circumstances the blind operation cannot be performed by any other method, and one must resort to the open operation.

The retinaculotome was made for me by Messrs. Allen & Hanburys, London.

The National Hospital,
Queen Square,
London, W.C.1

K. W. E. PAINE
M.B. Lond., F.R.C.S.

1. McArdle, M. J. Communication to the Association of British Neurologists, October, 1951.
2. Kremer, M., Gilliatt, R. W., Golding, J. S. R., Wilson, T. G. *Lancet*, 1953, ii, 590.



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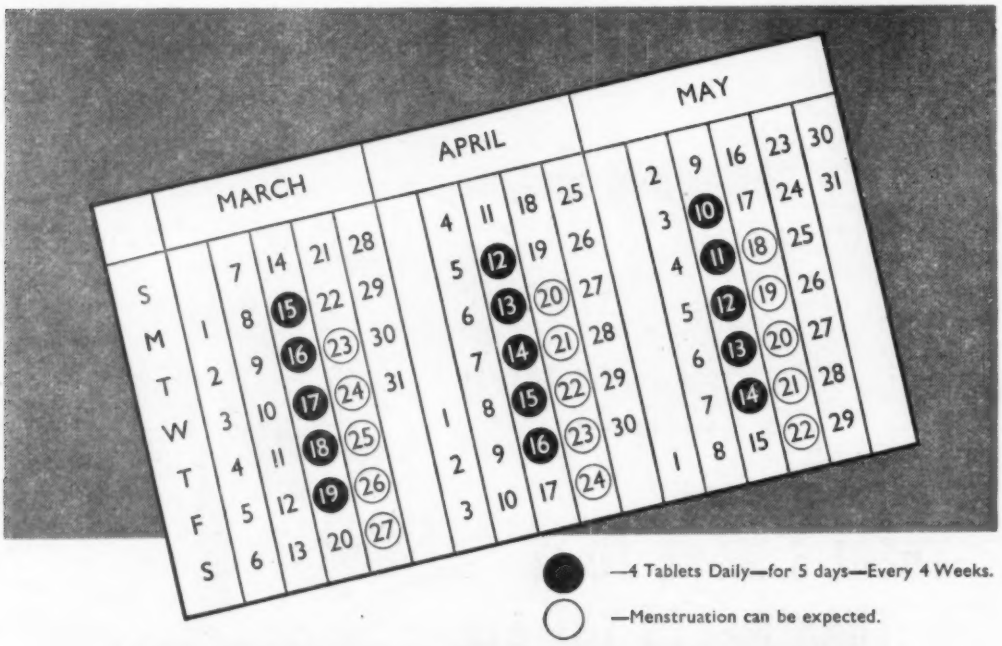

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THE LANCET

LONDON: SATURDAY, MARCH 26, 1955

Nutrition and Anæmia

IT has long been suspected that relative deficiency of some food factors plays a part in the ætiology of anæmia in apparently well-fed patients, and it is this suspicion that causes some physicians to treat patients with "blunderbuss" remedies containing various metals, vitamins of the B group, protein digests and fractions, and so on. Hæmatologists deprecate such polypharmacy, which runs counter to the considerable body of firm information about essential factors in the management of anæmia. Much of this information is well summarised in a symposium published in the *American Journal of Clinical Nutrition*.[1]

A substance may be a limiting factor in blood formation if it is not synthesised in the body, is not readily accessible to the bone-marrow, or tends to be affected by disturbances of absorption in the alimentary tract. The only truly essential hæmatinics whose supply is liable to be limited in one of these ways are iron for hæmoglobin formation, and vitamin B_{12} and folic acid for nucleic-acid synthesis; so far as we know, other substances are so readily available that they are never limiting factors. Judged by number of patients, iron deficiency is by far the most important cause; and on this Prof. CARL V. MOORE [2] makes some important observations. He and his co-workers have circumvented the difficulties of balance experiments by incorporating radioactive iron into various foods. Thus radioactive iron was injected into hens, and then their flesh, their livers, and their eggs contained the isotope; similarly vegetables were grown in nutrient solution containing radioactive iron. Such marked foodstuffs were used to prepare ordinary dishes and were fed to healthy people and to patients with iron-deficiency anæmia. The results show that, with few exceptions, the proportion of iron in food that is normally absorbed is 10% or less; the only two persons who absorbed more than 10% had been given chicken muscle. Iron-deficient patients only sometimes absorbed more than 10% from eggs; but they more often exceeded this level if chicken liver, vegetables, and yeast were given. An important finding was that ascorbic acid usually increases the assimilation of iron from food, and that this property is shared by some, but not all, reducing substances. The addition of hydrochloric acid to the stomach of patients with hypochlorhydria did not improve their iron absorption. These points are brought out in a study by STEINKAMP et al.,[3] undertaken to see whether iron salts used to "fortify" bread would be absorbed in large enough amounts to make the addition worth while. For industrial reasons ferric orthophosphate and reduced iron powder are used more often than ferrous sulphate; sodium ferric pyrophosphate has also been used. To the investigators' surprise these four forms of iron were equally effective when baked into bread, whereas in the free form ferrous sulphate was better absorbed than the others. Healthy people absorbed 1–12% of the iron given in the bread; iron-deficient patients absorbed 45–64% of the iron; and four people apparently healthy but suspected of having low iron stores absorbed 26–38% of the Fe^{59} used. MOORE states that the normal adult diet in the U.S.A. contains about 12–15 mg. of iron a day; so the amount absorbed from food is somewhere between 0·6 and 1·5 mg. daily. The amount will be less with poor diet, infection, diarrhœa, or steatorrhœa, and possibly greater in patients with iron deficiency. MOORE and his colleagues have also worked on the excretion of iron in desquamated skin-cells, sweat, and urine, and calculate that the daily loss of iron is about 1 mg. These figures show how precarious is the iron balance of the healthy woman during her menstrual phase of life and during pregnancy. The volume of menstrual blood is 35–70 ml.; at 12 g. hæmoglobin per 100 ml. of blood this means a loss of 14–28 mg. of iron—or 0·5–1·0 mg. a day over a twenty-eight-day cycle. During pregnancy the mother provides for her baby some 300–500 mg. of iron, or 1–2 mg. a day. Thus with not more than 1·5 mg. a day coming in from food, and up to 1 mg. a day excreted by regular channels, it requires only a poor diet or a little extra menstrual loss to cause a negative balance and eventual iron-deficiency anæmia. The pregnant woman is almost certain to lose some iron during the nine months' gestation. It is not surprising, then, that iron-deficiency anæmia is so common in these two groups of women. In men or in post-menopausal women iron deficiency is much less likely to develop unless there is some loss of blood. MOORE takes two hypothetical examples—a man with a hæmoglobin level of 15 g. per 100 ml. and a blood volume of 5 litres, and a woman with a hæmoglobin level of 14 g. per 100 ml. and a blood volume of 4 litres—and he calculates that if these persons absorbed no iron at all and continued to excrete 1 mg. a day, it would take six years in the man and four years in the woman before the hæmoglobin fell to 7·5 mg. per 100 ml. (50%). These times would certainly be longer in reality, because iron-deficient patients excrete less iron, and any iron in the diet tends to be absorbed more efficiently unless the small-intestine mechanism is abnormal. So MOORE concludes that, though it is theoretically possible for iron-deficiency anæmia in men and post-menopausal women to be purely nutritional, sources of blood-loss should be very carefully sought.

It has been often asserted that the absorption of iron may be helped by the addition of traces of metals—particularly copper, cobalt, molybdenum, and zinc. This question has been investigated by CARTWRIGHT.[4] He concludes that there is no evidence that either molybdenum or zinc have the slightest effect. Copper is in a different class. An anæmia of swine is traceable to copper deficiency, and CARTWRIGHT describes evidence that copper plays an important part in the absorption and utilisation of iron and its movement from iron stores. But this does not mean that any anæmic patient needs to be given copper. In fact it is very difficult to find a diet that does not contain an excess of copper; the newborn infant has large

1. Symposium: nutritional aspects of blood formation. *Amer. J. clin. Nutr.* 1955, **3**, no. 1.
2. Moore, C. V. *Ibid.* p. 3.
3. Steinkamp, R., Dubach, R., Moore, C. V. *Arch. intern. Med.* 1955, **95**, 194.
4. Cartwright, G. E. *Amer. J. clin. Nutr.* 1955, **3**, 11.

copper stores, and inorganic-iron preparations all contain traces of copper that are more than sufficient. So CARTWRIGHT, citing the dictum that "all unnecessary therapy should be avoided," advises against the administration of copper to patients. (It is just possible that some patients with sprue or the nephrotic syndrome may not absorb enough copper, but this is unproved.) Cobalt is known to have a definite effect on erythropoiesis, apart from the fact that it is present in the molecule of vitamin B_{12}. Cobalt-deficiency anæmia is recognised in ruminants, but this anæmia is now known to be due to deficiency of vitamin B_{12}. Administration of cobalt in relatively large amounts causes true polycythæmia in some animals and birds, with hyperplasia of red-cell-forming tissues, but this seems to be a toxic rather than a physiological effect. CARTWRIGHT points out that in man 5 μg. of cobalt is all that is needed daily, and probably much less suffices; clinical deficiency of cobalt per se has never been recognised. There is good evidence that administration of cobalt over a long period raises the hæmoglobin level in anæmia secondary to infection, malignant disease, and renal disease; this action is probably pharmacological, and there are many unpleasant side-effects. CARTWRIGHT does not think that there is any proof that cobalt aids the absorption of iron, and he is not convinced of its value in aplastic anæmia and chronic hæmolytic anæmia. (But Dr. FOUNTAIN and Dr. DALES [5] have lately described in these columns a case of pure red-cell aplasia in which other measures had failed and complete recovery followed administration of cobalt.)

MUELLER and WILL [6] have examined the relations between vitamin B_{12}, folic acid, and ascorbic acid in megaloblastic anæmia. They agree that vitamin B_{12} and folic acid act as catalysts in the formation of nucleic acid, and that ascorbic acid has an indirect effect on folic-acid metabolism. It has to be also assumed that vitamin B_{12} is in some way connected with folic-acid metabolism, since deficiency of vitamin B_{12} causes a conditioned deficiency of folic acid. Folic acid, they consider, produces temporary remission in pernicious anæmia by a mass-action effect, mobilising the depleted vitamin-B_{12} store and thus paving the way for a worse relapse with aggravation of neurological disturbances. MUELLER and WILL point out that vitamin B_{12} can be bound and utilised locally by erythropoietic cells and will cause them to mature, whereas folic acid has no such direct action. Folic acid acts at some other point in the biochemical synthesis of nucleoprotein; megaloblastic anæmia of pregnancy, for example, may be a conditioned deficiency of folinic acid co-enzyme. Our therapeutic use of vitamin B_{12} is influenced by the fact that intrinsic factor, secreted in man in the upper part of the stomach, is essential for its absorption from the small intestine. SCHILLING [7] estimates the daily requirement of vitamin B_{12} at less than 1 μg.; for therapy we usually give ten times this amount, by intramuscular injection or as nasal "snuff." VILTER [8] does not recommend the combinations of B_{12} with intrinsic factor that can be given orally; they are not equally effective in all patients and are relatively expensive.

5. Fountain, J. R., Dales, M. *Lancet*, March 12, 1955, p. 541.
6. Mueller, J. F., Will, J. J. *Amer. J. clin. Nutr.* 1955, 3, 30.
7. Schilling, R. F. *Ibid*, p. 45.
8. Vilter, R. W. *Ibid*, p. 72.

This symposium closely supports with scientific evidence what is generally regarded as good clinical practice—namely, to treat iron-deficiency anæmias with simple iron preparations that include no added trace metals, vitamin-B complex, and so on, and to give ascorbic acid with the iron; to treat pernicious anæmia with vitamin B_{12}, and the megaloblastic anæmias of pregnancy and steatorrhœa with folic acid; and never to give folic acid to patients with proved or suspected pernicious anæmia.

Clonal Ageing

THREE impressive lectures on the genetics of paramecium were recently delivered at University College, London, by Prof. TRACY SONNEBORN, of the University of Indiana. Although their subject was specialised, they included much to interest medical as well as general biologists. Among much important new information on ciliate genetics, SONNEBORN gave a convincing experimental analysis of the reason why stocks of paramecium invariably deteriorate unless they are sexually renewed. This organism shows very well the phenomenon of "clonal ageing"; and SONNEBORN's work explains the process in this instance. Unfortunately for those who work on mammalian ageing, the reasons are probably peculiar to paramecium; but they raise a great many points of fundamental importance in cytology.

The so-called ageing of clones bulked large in the minds of biologists in the 1890s when they considered senescence in higher organisms and man. A clone comprises all the cells produced by simple asexual fission from a given sexually produced nucleus. A variety of strawberry or of Russell lupin provides a familiar example: the original plant was a hybrid produced by the fusion of two gametes and grown from seed, and all its descendants produced by cuttings or by division of the original root stock constitute a clone. All the asexually produced descendants of a protozoan which has just undergone one of its characteristic sexual processes—conjugation, autogamy, pædogamy, and so forth—make up a clone. So, in a different sense, do the cells of a metazoan body, for they all arise by simple fission from one sexually produced nucleus. It was early observed that while some protozoans could apparently be maintained indefinitely by simple fission alone, others soon lost vigour and died if they were not permitted to undergo periodic sexual phases. WEISMANN had held that the germ-plasm was immortal and the soma destined to die; might it not be that the ageing of the metazoan body, and the loss of vigour in clones, arose from the same source—the necessity for periodic sexual reorganisation as a condition of continued vigour? MAUPAS propounded this idea; and for many years a vigorous competition was conducted between protozoologists in seeing how many asexual generations of paramecium, eudorina, and similar creatures they could rear. In the course of this process much nonsense was written about "potential immortality," but a great deal was learnt about protozoan reproduction and culture methods. It became evident that some clones deteriorate and others, including somatic cells such as fibroblasts in tissue-culture, do not. The results obtained by the gardeners were similar—there are plants which can be grown indefinitely from

cuttings, and others which lose thrift unless they are periodically regrown from seed. The possibility that one important kind of body-cell might undergo progressive loss of vigour, or progressively more inaccurate copying, the further it gets from the germ line, still remains for the gerontologist. Some plant clones deteriorate because they accumulate viruses; others fail with striking unanimity after a given period, whole plantations being simultaneously affected even when they are widely separated. A clonal degeneration of this kind ("June yellows" in strawberries) has lately been shown [1] to be a true degeneration of a particular genetic interest. Apart from this example, which is being investigated, the mechanisms involved in the decay of any of the susceptible cell-lines have not hitherto been established.

The mechanism which SONNEBORN finds has been suggested [2] but has never previously been demonstrated. When paramecium divides after a sexual process, the new nucleus of each daughter cell divides into two. One of these products, the micronucleus, which reaches the anterior end of the cell, has the normal diploid number of chromosomes, and is apparently concerned solely with conveying the genotype: it is, in other words, the "germ-plasm." The other portion, the macronucleus, controls the metabolism of the cell. It becomes highly polyploid, and at subsequent cell divisions, while the micronucleus divides evenly in the normal manner of nuclei, the macronucleus distributes its chromosomes at random to the daughter macronucleus arising from it. Because of the enormous number of sets which it contains, every cell in the earlier divisions has a fair chance of getting its quota, but with the passage of time more and more daughters receive an unbalanced set and a reduced physiological repertoire, and a chromosome once lost cannot be restored from the micronucleus except by sexual division—conjugation or autogamy. In the later stages of clonal senescence even sexual division is affected and abnormal or non-viable products increase. SONNEBORN has shown that this is not due to the accumulation of mutations, since it can be prevented by periodic autogamy, even though this does not alter the genotype: it appears to be due to injury inflicted upon the micronucleus itself through the abnormal intracellular conditions produced by the defective macronucleus. In ciliates the germ-plasm has to live in the cell where the processes of somatic maintenance are carried out, and it is therefore unusually exposed. This is probably a unique situation—it does not even apply in other ciliates—and the division of function between vegetative and germinal nuclei is confined to this group. But it does not follow that this type of clonal ageing has no bearing at all on senescence in higher animals. We do not know whether faulty copying and aneuploidy in somatic cells (which would be the rough equivalent of macronuclear degeneration in paramecium) help to determine the life-span of metazoa. Somatic aneuploidy, though it has been described,[3–5] is not a popular concept with cytologists; it is easily simulated by bad technique.[6] If it does occur in any important tissue, senescence, or some other adverse process such as malignancy, might well result from it. Furthermore we do not know exactly the extent to which somatic senescence can produce chromosomal damage in germ cells. Parental-age effects are familiar; but, in most of these, cytoplasmic factors appear to predominate, and the consequences are not as a rule genetically fixed. The real importance of Professor SONNEBORN's work, as revealed in his lectures, lies in the information about the fine structure of intracellular physiology which he has obtained by simple but highly ingenious methods. This approach has proved brilliantly successful, not because paramecium is a "good" organism, but because it has been studied by a good biologist. Its intracellular homœostatic systems are at least as complex, it seems, as the gross homœostatic mechanisms of man or dog. This is an alarming thought, but at least Professor SONNEBORN has shown how they can be approached.

1. McWhirter, G. In the press.
2. Fauré-Frémiet, E. *Rev. suisse Zool.* 1953, **60**, 426.
3. Hsu, T. C., Pomerat, C. M. *J. Morph.* 1953, **93**, 301.
4. Tanaka, T. *Cytologia, Tokyo*, 1953, **18**, 343.
5. Sorokina, M. I. *Bull. Acad. Sci. U.R.S.S.* 1950, **6**, 97.
6. Walker, B. E., Boothroyd, E. R. *Genetics*, 1953, **39**, 210.

Annotations

FIRST-AID TREATMENT OF HEAD INJURIES

MANY of us have seen the unconscious motor-cyclist lying on the road while people gather round and warn each other not to move him because ignorant manœuvres might do harm. Thus the unfortunate victim lies in a huddle until an ambulance arrives with its staff trained in first-aid. For what happens next we must turn to the first-aid manuals, and we at once realise that these give instruction which ignores modern knowledge regarding the causes of death after head injury: the grave dangers of inhalation asphyxia in the unconscious patient have not yet filtered into these manuals.

After head injury vomiting is common, and the inhalation of gastric juices may lead to death a few hours after the inhalation has taken place. Yet one first-aid manual advises for fracture of the skull: "Lay the patient on his back in all cases . . . keep his head and shoulders raised and support them on a pillow or a rolled-up blanket." Again in the first-aid treatment of insensibility: "Lay the patient on his back . . ." These instructions are acted on throughout the country, even though they ignore the dangers of inhalation of blood and vomit. On the other hand a leaflet on the Early Treatment of Head Injuries, lately published by the advisory committee in neurology and neurosurgery to the North East Metropolitan Regional Hospital Board, declares: "*the patient should be kept on his side with a clear airway.*" This advice is intended for doctors and nurses, but it is even more important that it should be acted on before the patient reaches hospital, when perhaps blood is flowing into the pharynx from a fractured base of skull.

There are some hazards in encouraging first-aid workers with regard to postural drainage of the throat and lungs, for multiple injuries may be present; but this difficulty is not insurmountable, and the present advice is so dangerous when the patient is deeply unconscious that those concerned with first-aid instruction should review the matter without delay. The first-aid worker could at least be taught to listen to the patient's breathing, and, if there is a "death rattle" in the throat, to establish postural drainage whatever the risks. In such cases it is essential that postural drainage of the air passages be maintained in the ambulance, on the hospital trolley, and in the X-ray department as well as in the hospital bed, in the same way as with patients who have bulbar paralysis due, say, to poliomyelitis.

BACKWARD IN READING

LIKE a particle dropped into a supersaturated solution, even a small disability can act as a nucleus round which other things crystallise. Learning to read is not essential for survival and no instinct is satisfied by the power to distinguish written symbols: in fact man got along without this skill for more than a couple of million years, and other animals still do. Yet so high is the value we set on it in Western civilisation that the child who fails to read by the "proper" age (arbitrarily fixed at 6–7) is an object of concern to his family and shame to himself. His difficulties, it is believed, may be due to crossed laterality—a personal peculiarity which does not seem to hinder his performance in any other direction. Pearce,[1] who studied the lateral preferences of a group of healthy school-children, found complete right-sided dominance in only 49%; complete left-sided dominance was much rarer, only 4% of the children showing it; the remaining 47% had one or two organs—eye, ear, hand, or leg—out of step. Nearly three-quarters of those with schooling difficulties belonged to the crossed-lateral group; and those with specific reading difficulties had one basic symptom—they tended to reverse the order of letters as they read them. The left-eyed child finds it natural to scan a line of type from right to left; he may meet our arbitrary demand that he should read from left to right by unintentionally swapping a letter round from time to time. If the letters are arranged vertically, it seems, they give him no trouble. A child with this tendency to see letters transposed will inevitably take longer to learn to read than others, especially if he is not bright enough to overcome the difficulty by himself. The dismay of his parents and teachers and derision of his clever little friends can be very damaging to his self-esteem, and if he failed to call out defences he would be a very abnormal child indeed.

Downes and Schuman[2] report some of the forms these defences may take. The most obvious thing about him is that he hates being made to read and may panic or stammer if he is given a reading test. Other distress signals, they note, are "knee-jerking, nail-biting, paper tearing, face fussing, hair pulling (both his own and that of other students)." Again, he may use bad language, cheat, steal, destroy property, or bully; or he may determine to excel in other directions—captaining a team, taking up a hobby, or making himself popular with the girls. At home he does anything but read, preferring radio, television, bird-watching, telephoning his friends, or even helping with the washing-up. He will never write a letter. He plays with younger children and prefers the company of "the maid, the handyman, and the not-so-nice children down the block." His sense of being different, of having a gap in his faculties, may be very alarming to him: "there seems to be a deep-seated, pervasive, terrifying kind of disunity in the world of the disabled reader." He tends to be emotionally immature, and knows it; and his schoolmates know it. Feeling inadequate, and lacking expert help in overcoming his difficulty, he may become deeply discouraged: "he comes to equate good reading, school success and high marks with parental approval and love." This anxiety for approval may be transferred in later life to his employer or to society. He may become a perfectionist, unwilling to risk a mistake; and his dread of making one may limit more and more the field in which he dare trust himself. Such a child makes no trouble for parent or teacher: "he finally never makes any trouble, or anything else for that matter."

It is unfortunate that such a mild and common deviation from the usual pattern should be allowed to become the centre for a host of disabilities. A better understanding of the causes of backwardness in reading, and more skilled management of those who display it, might save much unnecessary trouble both for teachers and taught. Reading disabilities are not uncommon: Downes and Schuman estimate that 12–15% of boys and half that proportion of girls show them. It seems worth trying to discover these children early and give them the kind of help they need.

1. Pearce, R. A. H. *Arch. Dis. Childh.* 1953, **28**, 247; see also *Lancet*, 1954, i, 141.
2. Downes, M. G., Schuman, R. S. *New Engl. J. Med.* 1955, **252**, 217.

PSYCHIATRIC EVIDENCE IN MURDER TRIALS

BETWEEN 1900 and 1949 more persons in the United Kingdom accused of murder were sent to Broadmoor than were executed; and in considerably more than half the murder trials in England and Wales the question of the accused person's sanity is debated in court. It might therefore be expected that the evidence of doctors with experience of mental disease would carry much weight in such trials. Some of the reasons why this is by no means invariably so were considered by Dr. J. A. Hobson at a meeting of the Howard League for Penal Reform on March 16.

The excuse that psychiatry is a new subject and that the courts, being conservative, are reluctant to accept its teachings can, said Dr. Hobson, hardly be maintained; for, although the term psychiatry was not introduced until a few years after the McNaughten trial, specialists in mental disease were giving evidence in murder trials long before that date. The main cause of the resentment felt by the legal profession for the psychiatrist's evidence was that he was trying to usurp the domain of the lawyer when he gave evidence about mental happenings, motives, or antisocial behaviour. The suspicion that the psychiatrist was biased was no new thing in English courts of law: the Lord Chancellor in 1862 stated that "the introduction of medical opinions and medical theories into this subject [the criminal law] has proceeded upon the vicious principle of considering insanity as a disease." The fact that in English criminal courts witnesses were called either by the prosecution or the defence, and that there was no machinery for bringing before the court the evidence independently, at once suggested bias. The conflict between the psychiatric witnesses on the two sides was often more apparent than real, but court procedure emphasised any differences. It sometimes became the duty of the opposing counsel deliberately to make differences seem as wide as possible, and journalists in reporting sensational murder trials exaggerated still further any differences of opinion.

The psychiatric witness in a murder trial is anxious to say all that can possibly be said on behalf of the accused, and this is sometimes regarded as bias. Dr. Hobson suggested that it was in keeping with the general principles of English criminal law that the psychiatrist should be biased in this way, whether he gave evidence for prosecution or for defence. Sometimes not all the facts in the psychiatrist's report were brought out in evidence, since they might be deleterious to one or other side, and this resulted in the court not being given all the information available. Dr. Hobson agreed with Dr. Desmond Curran's opinion[1] that bad psychiatric evidence was being called too often, and that the procedure for calling psychiatric evidence was largely responsible for this—in other words, that the legal profession was as much to blame as were the doctors. There were three principal causes for this unsatisfactory state of affairs:

1. Solicitors select psychiatric witnesses by going from one psychiatrist to another until they find someone willing to give an opinion favourable to their client. If two or three experienced psychiatrists cannot find anything helpful to say, any psychiatrist who will say more will probably be either less skilled or less honest.

1. Curran, D. *In* The Roots of Crime. Edited by Sir Norwood East. London, 1954.

2. Good psychiatric evidence is not always available, since many first-rank psychiatrists will not take court cases. The time and trouble involved, and the risks of unfavourable publicity resulting in loss of professional prestige, make many psychiatrists chary of undertaking such work. Dr. Hobson remarked that the provisions made for compensating psychiatric witnesses in legal-aid cases were most inadequate: the popular belief that there were large rewards for the forensic psychiatric expert was quite unfounded. Proper examination involved several interviews. In addition, he usually found it necessary to make inquiries outside the prison, visiting the prisoner's home, interviewing relatives and workmates, and sometimes arranging with the police for further investigations to be made. It was always necessary, in addition, to have a consultation with solicitors and counsel.

3. Psychiatric evidence is also sometimes bad because it is given in psychiatric rather than in legal language. It is not sufficiently realised that there are three languages spoken in court: that of the psychiatrist or other medical expert, legal language, and the layman's language. According to Mayer-Gross et al.[2]: "The medical witness is embarrassed by his incapacity to put highly relevant facts about the state of mind of the accused. The debate centres around, not the medical facts, but metaphysical issues of which, if they have a meaning at all, the medical man has no direct knowledge. The language is alien to him. . . . He is likely to be asked to give yes or no answers, although he knows full well that he cannot in most cases be dogmatic, and that in fairness to himself and to the court he should explain the significance of his replies to the case at issue."

The McNaughten rules had been criticised so often for their divorce from reality, their illogical metaphysical basis, and the inequality with which they were applied that it would be repetitious to discuss them further. Dr. Hobson felt that they were a serious barrier to the development of understanding between psychiatrist and lawyer, and that they impeded the lawyer's understanding of the facts of mental illness. He agreed with Mayer-Gross et al.: "Psychiatric evidence in English courts will not be measured by a realistic yardstick until the M'Naghten Rules are abolished altogether"; but he did not think that Mayer-Gross went far enough. He himself preferred the view of Overholser[3]: "Capital punishment has no place in the modern scheme of penal treatment, and if capital punishment were abolished nearly all of the public furor against expert psychiatric testimony would disappear." Not only would the furor disappear but there would be very little need of expert psychiatric testimony. When capital punishment was abolished the psychiatrist would seldom be called on to give evidence; and when he did so he would at last be able to talk sense instead of psycho-legal nonsense.

CALCIUM DEPOSITS IN THE HAND

SUDDEN acute pain in the hand is usually due to infection or injury. Carroll et al.[4] draw attention to one of the less common causes—namely, calcium deposits. In most of their cases the patient sought attention soon after the onset of pain, cradling a swollen and tender hand. The wrist and digits were flexed and immobile, and there were tender spots around the wrist or in the region of the finger-joints. Radiographs of the most tender areas showed calcium deposits; these deposits were often small, and in the region of the carpus special projections were necessary to display them. The deposits lay within the muscles and ligaments, most commonly in the flexor carpi ulnaris in the region of the pisiform bone. If the deposit was surgically exposed, it appeared as a creamy material beneath œdematous and inflamed peritendon or ligament. There is no evidence that trauma plays any direct part in the production of such deposits, and although some patients had similar deposits in other regions there was no very clear metabolic factor. Radiography showed that calcium deposits might be confused with chip fractures, accessory bones, or small bony deposits due to periosteal tears. The deposits were temporary: the disease was acute, severe, and brief, and without treatment the pain subsided within three weeks. The radiographic shadows commonly disappeared even sooner: the average time before disappearance was two weeks. No deposit persisted for as long as six months. Local injection of procaine relieved the symptoms, and surgical evacuation of the deposit seemed rarely to be indicated.

Diagnosis of this disorder should not be difficult. Differential diagnosis from minor fractures may present problems, but the more widespread disturbance and the more severe pain from the calcium deposit should be valuable guides. Clearly the final proof is radiographic, and the early disappearance of these deposits confirms their nature.

2. Mayer-Gross, W., Slater, E., Roth, M. Clinical Psychiatry. London, 1954.
3. Overholser, W. The Psychiatrist and the Law. New York, 1953.
4. Carroll, R. E., Sinton, W., Garcia, A. *J. Amer. med. Ass.* 1955, 157, 422.

TUBERCULIN TESTS

THE W.H.O. Tuberculosis Research Office has continued its investigation of the prevalence and cause of low-grade tuberculin sensitivity in man.[1] The differences in the patterns of sensitivity have now been studied in twelve countries, from Denmark, England, and the U.S.A. to Ethiopia, the Phillipines, and Viet Nam. The greater the response to large doses of tuberculin in those insensitive to smaller ones, the more the reactions to the small doses tend to fall within the 6–12 mm. range, and the more the frequency-distribution resembles the normal curve, with a clear demarcation between the group with large and the group with very small or no reactions. If it is assumed that only the normally distributed portion of the curve represents infection with tubercle bacilli, the proportions of infected in the different countries can be approximately estimated. Among school-children this proportion was found to vary from nearly 50% in the Sudan to 4% in the White population of the U.S.A. and a little under 10% in this country. From further assumptions—supported by other observations—it can be calculated that non-tuberculous tuberculin sensitivity occurs in over 90% of school-children in the Phillipines, Viet Nam, and the Sudan, 70–80% in India, about 50% in Ethiopia and Turkey, 20–30% in England and Mexico, and under 10% in Denmark and the southern part of the U.S.A. The practical implication of these investigations, if the hypothesis of non-tuberculous reactions is correct, is that only in the northern part of the U.S.A. can it be inferred that almost all the children around 10 years of age who have reactions of 6 mm. or more to 5 T.U. are infected with tubercle bacilli. In southern India the proportion falls to 50%; and in England it is roughly 85%.

As we have previously said,[2] the description "non-specific" used by the W.H.O. workers for this type of sensitivity is misleading. It implies that the reaction is due, not to sensitivity produced by infection with a particular organism, but to a general change in the sensitivity of the skin to many stimuli. Moreover, it implies that the tuberculin reaction to human-type purified protein derivative is specific for human-type tuberculous infection. This is not true, as the W.H.O. teams have themselves demonstrated. The mean size of the reaction to 10 T.U. in adults in Denmark was found to be related to the past prevalence of tuberculosis in cattle, a greater mean size being found in districts with a previously high prevalence and, therefore, in populations subjected to greater risk of bovine infection.[3] Cattle infected with mycobacteria other than *Mycobacterium tuberculosis bovis* become sensitive not only to tuberculins prepared from the infecting mycobacteria but also to bovine tuberculin. But the homologous tuberculin

1. *Bull. Wld Hlth Org.* 1955, 12, 63.
2. *Lancet*, 1954, i, 244.
3. *Bull. Wld Hlth Org.* 1955, 12, 277.

usually causes a larger reaction than the heterologous tuberculin.[4] The W.H.O. investigators tested many people in India with equal quantities of both human and avian tuberculin.[5] Those showing a high degree of sensitivity to human tuberculin, presumed to be infected with human tubercle bacilli, gave smaller reactions to the avian tuberculin. But in the group reacting only to large doses of human tuberculin the reactions to avian tuberculin were the larger. It is not suggested at present that the low-grade sensitivity is caused by infection with avian tubercle bacilli, although disease in man can indeed be caused by these organisms.[6 7] The cause of the sensitivity may, however, be more closely related to avian than to human *M. tuberculosis*. There are many other mycobacteria in man's environment, and the observed low-grade sensitivity may be due to infection by several of these at once, the particular agents varying in different localities. But the sensitivity is neither more nor less specific to a particular mycobacterium than is the sensitivity produced by human tuberculosis. It seems preferable to call these reactions to small doses of human tuberculin "non-tuberculous." It might, of course, be objected that infection by any type of *M. tuberculosis*, including avian bacilli, is a tuberculous infection; but the proposed term certainly has a greater practical value, for it implies that the reactions do not have the same diagnostic and epidemiological significance as the true "tuberculous" tuberculin reactions.

HANDWRITING AND THE PSYCHE

READING the character from the handwriting used to be an elegant parlour game, at which a few intuitive people managed to excel. That handwriting may provide clues for psychiatric diagnosis is a more recent idea. Captain William R. Perl,[8] chief clinical psychologist at the United States Disciplinary Barracks at Fort Leavenworth, Kansas, says that it is based on the assumption "that an individual is self-consistent, and that such self-consistency is reflected in one way or the other by *all* his behaviour and actions." He adds two facts which he holds to have been established experimentally: (1) that handwriting is both a product and a permanent record of a person's highly individual motions; and (2) that "there is an intricate and interpretable relationship" between a person's motions and his emotions. We write (most of us) with some regard for legibility, under the influence of contemporary style, and within an arbitrary alphabet; but these limitations apart, we show a luxuriant variety in the use of the pen. It is not the hand that writes, however—it is the whole man. People who lose their hands and learn to write holding the pen in the mouth or between the toes go on forming the letters in their accustomed way. Two specimens of Nelson's handwriting, reproduced in Perl's article, show that his letters sloped forwards while he was still using his right hand, and on the whole backwards when he was obliged to use his left; but they are essentially the same letters: the word "Battle," which occurs in both samples, has the same capital "B," made like a "13," the same interruption after the initial, the same long first "t" and smaller second "t," and the same sort of cross-bar. Captain Perl does not note, as he might have done, that during the ten years separating the two samples Nelson had acquired a Greek "ε"—an affectation which, in adolescents, sometimes signifies an ungratified wish for importance. It would be interesting to know what it signified in one who was already a national hero.

The individual character of handwriting starts early—from the first writing lesson, in fact. All the children in a class may learn together from the same teacher, and using the same fixed copy; but, Perl says, "one child will use up the writing space with a few bold strokes, while another, expressing his personality, will hide his weakish and wavy lines in one corner of the space. One writes with meticulous care, thus displaying compulsive elements; while the other will not care for the details, solve the problems carelessly, with untidy result." Pressure in handwriting probably tells something about the psychological state of the writer, though it must not be considered, Perl suggests, in isolation, but only as part of a constellation. Strong pressure, often interpreted as a sign of energy, may in fact indicate neurotic tension; it may also (though he does not say so here) indicate a mood of anger, or of enthusiasm. He describes pressure as "the graphic record of our reaction to the resistance created by the friction between paper and pen"; and the way in which we overcome this obstacle of friction may possibly indicate something about our general method of dealing with obstacles. The writer who overcomes the friction by driving his pen forcefully is not necessarily a forceful person: he may be confused and disorganised by the problem—weak, in fact, rather than strong. The man who, instead, moves his pen lightly to reduce the friction may not be weak: he may be one who does not waste energy needlessly but who adapts himself to his opportunities.

Something of the character of the writer inevitably appears in his signature, and in the letter "I." The self-confident "I" of the man who invites inspection is very different from the mild and unassuming "I" of the meeker man. The signature, often expansive and dashing in early youth, settles in time into the form which the owner wishes to present to the world: large or small, simple or showy, precise or vague. But it is not, even then, beyond change: make a man a dictator and his signature suffers accordingly. Reproductions of Mussolini's signature from the time when he was a fairly unknown journalist, and wrote a modest schoolboy hand, to the time when he was a fully fledged dictator show the deplorable inflation of his self-regard.

Physiologically, handwriting is the result of muscular contraction and release, the balance between them giving rhythm; and study of this rhythm in patients who are mentally sick may prove useful, Perl suggests, in psychiatric investigation. Disturbances of rhythm are not seen in cyclothymic patients. The manic patient's handwriting, though often large and exaggerated, has a smooth, flowing, and even accentuated rhythm; and the writing of the depressed patient, though it may sink gloomily downwards from the start of the line, and though the letters may be blunted and toppling, yet flows rhythmically across the page. The hand of the schizophrenic, however, shows a broken rhythm, suggesting a loss of balance between muscular contraction and release. Perl suggests that a casual inspection of a patient's handwriting may sometimes be enough to set his doctor on the right diagnostic track, or lead him to counsel psychiatric investigation. The method, when it is more fully developed, may also, he thinks, throw light on the psychology of those historical persons who have rashly left us specimens of their handwriting.

F.R.S.

AMONG the twenty-five new fellows of the Royal Society we are glad to see the names of three members of the medical profession—namely, Prof. A. W. Downie, of Liverpool; Prof. K. J. Franklin, of St. Bartholomew's Hospital; and Sir Harold Himsworth, of University College Hospital and the Medical Research Council.

Sir GODFREY HUGGINS, on whom a viscounty has been conferred, has chosen the title of Viscount Malvern of Rhodesia and of Bexley in the county of Kent.

4. Green, H. H. *Vet. J.* 1946, **102**, 267.
5. *Bull. Wld Hlth Org.* 1955, **12**, 85.
6. Bradbury, F. C. S., Young, J. A. *Lancet*, 1946, **i**, 89.
7. Dragsted, I. *Ibid*, 1949, **ii**, 103.
8. *Amer. J. Psychiat.* 1955, **111**, 595.

Special Articles

METALLIC POISONS AND THE NERVOUS SYSTEM*

J. W. ALDREN TURNER
M.A., D.M. Oxfd, F.R.C.P.
NEUROLOGIST, ST. BARTHOLOMEW'S HOSPITAL, LONDON

IN clinical neurology the metal which has provoked most interest lately is copper, which in hepatolenticular degeneration is excreted in the urine and deposited in excessive quantities in the liver and basal ganglia (Cumings 1948). Nevertheless occupational poisoning with copper seems very uncommon (Heyroth 1949) and neurological involvement has not been recorded. Industrial poisoning with manganese produces a clinical picture remarkably similar to hepatolenticular degeneration.

MANGANESE

The first account of manganese intoxication was given in 1837 by Couper, who described its effects in 2 men employed in grinding manganese peroxide in the manufacture of bleaching-powder. Little further interest was taken in the condition till the 1920s. Charles (1927) described 11 cases in England, and a number have been reported from other countries (Edsall et al. 1919, Flinn et al. 1941, McNally 1935), including 75 from Chile (Jiminez et al. 1946). Most patients have been men employed in mining and separating manganese ore.

Clinical Picture

The neurological involvement is insidious in onset and slowly progressive as long as the patient remains exposed to manganese dust. There is fatigue on exertion, rigidity of the limbs and trunk, and a tendency to walk on the metatarsal joints; the patient's face becomes expressionless (with at times a spastic smile) and he displays emotional lability—smiling and laughing hilariously without adequate cause—and a coarse tremor of the head and limbs, sometimes of intention type. From the clinical descriptions and photographs given in Charles's paper, the condition resembles hepatolenticular degeneration and some forms of postencephalitic parkinsonism rather than degenerative paralysis agitans. There is no mention in the various papers of a corneal ring comparable to the Kayser-Fleischer ring, but it is not clear how thoroughly the corneas have been examined.

Pathology

A detailed post-mortem examination of the brain of a man who died of cardio-renal disease fourteen years after exposure to manganese and who had characteristic neurological symptoms was made by Canavan et al. in 1934. There were diffuse cellular changes in the cerebral cortex and cerebellum, but the significant changes were in the basal ganglia with little difference in intensity between the caudate nucleus, the putamen, the globus pallidus, and the thalamus. Similar but less detailed findings have been recorded in other cases, and cirrhosis of the liver has also been found in patients with chronic manganism. In monkeys repeated intraperitoneal injections of manganese chloride have produced gross pathological changes in the liver and lenticular nucleus (Mella 1924); and in rabbits, dogs, and rats chronic manganese poisoning has caused diffuse cerebral lesions, with maximum incidence in the corpus striatum (Tolyskoya 1952). There is a close clinical and pathological similarity between chronic manganism and hepatolenticular degeneration, but the cause of the specific affinity of manganese and copper for the basal ganglia and liver remains undiscovered.

* Based on a paper read to the section of neurology at the annual meeting of the British Medical Association in Glasgow, July, 1954.

MERCURY

The dangers of mercury have been recognised since the time of Pliny (Hunter 1935). The two predominant neurological symptoms are erethism and tremor.

Erethism is the name given to the curious psychological state which is often the first symptom, sometimes in association with stomatitis. The sufferer becomes unusually tired, is easily upset and embarrassed, is in constant fear of losing his job, dislikes meeting people, and easily loses his self-control. The word has been said to be derived from ἐρυθρός, red, to describe "blushing embarrassment of the sufferer" (Buckell et al. 1946); but the Oxford English Dictionary derivation, which would seem the more probable, is from ἐρεθίζειν, to irritate.

Tremor is usually a later symptom, affecting the hands (making writing difficult), the face, the tongue, and the legs. The tremor is considerably coarser than in thyrotoxicosis; and the combination of tremor, difficulty in articulation, and mental symptoms may confuse the diagnosis. Some years ago I saw a patient who had been admitted to hospital with the provisional diagnosis of general paralysis of the insane, and the correct diagnosis of chronic mercurialism became apparent only when it was realised that his work consisted in filling thermometers with mercury.

Mercurialism has occurred in a number of occupations, the best known of which is probably the felt-hat industry. There mercury nitrate is used in the carrotting process, in which the smooth resilient hairs are made rough and limp to facilitate felting. This danger gave rise to the phrase "as mad as a hatter," which *Alice in Wonderland* later made familiar.

Recently attention has been drawn to mercurialism arising in an unusual way.

In criminal investigation "grey powder" is often used to bring out finger-prints because it has a special affinity for the sweat-formed latent prints and produces a good print for photographing. A body of men specially trained in this work is employed in the Lancashire Constabulary, and investigation of 32 of these men in 1949 by Agate and Buckell disclosed 7 with mercurial tremor, 1 being severely affected; in 4 there was evidence of erethism, either at the time of examination or in the past history. As a result of this a powder not containing mercury has been substituted for grey powder in that particular police force. Some years earlier, in Denmark, lead poisoning was diagnosed in a policeman who had been using white lead to develop latent finger-prints (Nyfeldt 1937).

In 1951 chronic mercurialism was recognised in 5 men employed in repairing direct-current electric meters (Bidstrup et al. 1951). The first of these 5 cases is of special interest.

He developed tremor of the hands, arms, and legs together with irritability and stammering, and disseminated sclerosis was diagnosed. Some time later, when his condition had deteriorated, he read a newspaper account of mercury poisoning in the Lancashire policemen just referred to. He told his doctor that his work involved handling mercury, and in this way the diagnosis was eventually reached. 4 other men doing the same work were also found to be affected.

Direct-current meters contain a mercury bath in which an armature revolves between the poles of a magnet. The armature disc becomes coated with a rough amalgam which has to be scraped off as it turns in a lathe, and during this stage of cleaning small particles of mercury may be carried into the atmosphere; this was thought to be the cause of the mercury poisoning.

Mercury in teething-powders has been suggested as a cause of pink disease in infants (Warkany and Hubbard 1948, Farquhar 1953, Dathan 1954), and high urinary levels of mercury have been found in this condition.

METHYL MERCURY COMPOUNDS

An entirely different neurological picture from ordinary mercurialism is seen in poisoning with methyl mercury compounds. The first 2 cases (Edwards 1865, 1866) were in 2 laboratory workers at St. Bartholomew's Hospital who were using dimethyl mercury in research on the valency of metals. These 2 men developed numbness of the hands, ataxia, impaired vision, and mental dullness progressing to confusion, coma, and death; while a 3rd man affected similarly but less severely made a very slow recovery. In 1940 Hunter and his colleagues investigated 4 men who were poisoned by the inhalation of methyl mercury compounds in a factory where fungicidal dusts were manufactured without the use of completely enclosed apparatus. These men developed ataxia, dysarthria, and gross constriction of the visual fields without changes in the optic discs or retinæ.

Pathology

In 1954 Hunter and Russell reported the post-mortem findings in 1 of these patients who had died of heart-failure. The important changes were severe atrophy of the medial surface of both occipital lobes, particularly about the anterior end of the calcarine fissures, and gross atrophy of the folia in the depths of the sulci in both lateral lobes of the cerebellum, posterior to the primary sulcus. Microscopy showed severe loss of neurones in the atrophic areas of the occipital lobes, while in the affected areas of the cerebellum there was profound loss of cells in the granule-cell layer with general preservation of Purkinje cells. No abnormality was found in the spinal cord or nerve-roots. This curious selective atrophy in the occipital lobes and cerebellum probably accounted for the gross constriction of the visual fields and the general ataxia.

LEAD

Because of preventive measures, industrial lead poisoning of any severity is very rare in Britain, but it is still occasionally found outside industry. Three years ago twin girls, aged 2, were admitted to St. Bartholomew's Hospital with plumbism (Millichap et al. 1952). 1 had anæmia, slight jaundice, and peripheral neuropathy affecting the anterior tibial muscles, and the other only anæmia; both had punctate basophilism, "lead lines" in the long bones, and a high blood-lead content. It was discovered that their cots had been painted with lead paint by their father and the children had regularly gnawed the newly painted cots. Other similar cases have been described, and also acute lead encephalopathy in breast-fed infants whose mothers were using lead nipple-shields (Burrows et al. 1951, Gordon and Whitehead 1949). Recently the homely "iced lolly" has been suggested as a potential cause of lead poisoning (Semple 1953), though no actual case has been described. Iced lollies may contain up to 11 parts per 1,000,000 of lead together with copper, zinc, and tin which are absorbed from the metal moulds in which the water and coloured syrups are frozen.

The neurological symptoms of lead poisoning are well known, but two aspects are worth some discussion—the nature of the so-called neuritis, and the recent suggestions for using a chelate in treatment.

Lead neuritis is unlike any other type of peripheral neuritis in that it is purely motor (usually involving only limited groups of muscles), is not restricted to individual peripheral nerves or roots, and may involve either proximal or distal parts of the limbs. As a rule the muscles involved are those which the patient uses most constantly. Though the commonest form involves extensors of the fingers and wrist with sparing of abductor pollicis longus and brachioradialis, it may affect the shoulder-muscles of men whose work involves much lifting, the legs of potters who turn their wheels by foot pressure, and the finger and thumb muscles of the left hand of file-makers who grasp a chisel firmly in this hand in the process of file-cutting (Cantarow and Trumper 1944).

These observations suggest that the effect of lead may be primarily on the muscles rather than on the peripheral nerves or nerve-roots, and experimental evidence favours this view.

Reznikoff and Aub (1927) showed that the diffusion of inorganic phosphate from isolated muscles is greatly increased after exposure to lead, and that such muscles fatigue more rapidly than normal. In 1930 Lundsgaard established that the energy for muscle contraction is provided by the breakdown of phosphocreatine into creatine and inorganic phosphate, both of which can diffuse freely through the muscle membrane. Steiman (1939) found that in the muscles of animals exposed to lead the resting level of phosphocreatine was much reduced, and that after a two-minute tetanus there was practically no resynthesis of phosphocreatine, whereas normally complete resynthesis took place within half an hour. The force of muscle contraction is recognised to be proportional to the breakdown of phosphocreatine, and these experimental observations strongly suggest that the cause of the muscle weakness in lead palsy is a disturbance of resynthesis of phosphocreatine in the muscles—possibly by the action of lead on intracellular enzyme systems—rather than a neuropathy.

The accepted *treatment* of lead poisoning in the more acute stages has been to encourage the deposition of lead in the skeleton by means of a high-calcium diet and the administration of calcium, together with symptomatic measures such as the reduction of raised intracranial pressure in encephalopathy and physiotherapy in lead palsy. When symptoms subside it is sometimes difficult to decide whether to attempt to mobilise the lead from the skeleton by giving a low-calcium diet along with ammonium chloride or potassium iodide, or whether to leave the lead deposited in the skeleton. Mobilisation of lead in this way sometimes results in exacerbation of toxic symptoms, while if the lead is left in the bones symptoms may arise later during an acute infection or after an operation. Dimercaprol (BAL) has been used, apparently with success, in some cases (Bastrup-Madsen 1950), but, although the excretion of lead in the urine may be increased considerably, there is a real danger of an increase of the symptoms from the redistribution of lead in the body tissues (Vigliani and Zurlo 1951).

Recently a new approach to the treatment of lead poisoning has been suggested, involving the use of a chelate (Foreman 1953). A chelate is a type of chemical compound which does not ionise. Ethylenediamine-acetic acid (E.D.T.A.) forms chelates with certain metals, in particular calcium and lead which are water-soluble and non-toxic and are excreted in the urine unchanged. Fortunately the affinity of this substance for lead is considerably greater than for calcium. The rationale of the treatment is that after administration of calcium E.D.T.A., calcium will replace lead in the body and lead E.D.T.A. will be carried in the blood-stream and excreted in the urine; because the chelate does not ionise there will be no danger of exacerbating the symptoms of lead poisoning.

In laboratory animals calcium E.D.T.A. has been found to remove lead and certain other heavy metals such as yttrium, americium, and plutonium. The number of patients treated is still small, but in the United States Rubin (1953) reported moderate clinical improvement in a child with acute plumbism, and Foreman and his colleagues (1953) mention 5 children and 3 adults in whom pronounced alleviation of symptoms and a considerable increase in lead excretion followed treatment with calcium E.D.T.A.; there was no evidence of toxic side-effects, and there were no symptoms attributable to mobilisation of lead. In England Giles et al. (1955) have reported successful treatment of a child, aged $2^1/_2$, with acute lead poisoning. These preliminary results suggest that calcium E.D.T.A. chelate may have an important place in the treatment of lead poisoning.

References at foot of next column

LESSONS IN WARD 10

KAY VAUGHAN
N.F.U.
TEACHER IN THE THORACIC UNIT, FRENCHAY HOSPITAL, BRISTOL

AT a casual glance these children with bronchiectasis seem to have the exuberance of a normal child; but on closer inspection most of them appear to be thick with a perpetual cold, and to have the listlessness of a general septic condition. Here is material to challenge the ingenuity of the teacher, who has to conduct school in the midst of a highly organised hospital life with children eager, yet of limited capacity.

The world of these children has been narrowed by their disability. Apprehension on the part of the parents has, perhaps, led to over-protection and consequent frustration of the child. Attendance at school has been irregular, resulting in backwardness and lack of self-confidence. Moreover, a child who seems to have all the symptoms of a chronic cold has little chance to develop latent abilities in the social activities of a school.

When the child first enters a hospital ward and finds that the routine of schooling is expected of him as usual, even in this strange world, he may well look upon the teacher as his one link with a normal life. The initial impact of hospital life can be alarming. Derek said, "When I first went into Ward 10 I was frightened because I did not know anyone. It also worried me very much to see the surgeon walking about with his operation uniform on." The children have to adjust themselves to a world of strange faces, unusual equipment, and many investigations. Instead of the atmosphere of the normal classroom, school takes place in the open ward where nursing routine must go on. Treatment must come first, medical staff must do their rounds, and X-rays must be taken. With all these claims on the child's time, the school could not run smoothly enough to have real value unless all departments coöperated generously in keeping school hours (9.30–11.30 and 1.30–3.30) as free from interruption as possible.

In this ward of twenty beds, most of the children are up all day unless they have had an operation. The length of stay may be anything from three weeks to six months. Children aged from 2 to 12 are on the school register, and this gives an average class of fifteen, for even bed patients are anxious to attend.

Active Learning

The "activity" method has been found the most successful way of teaching these children. Its essence is to concentrate on a centre of interest common to the group, and in the development of such a project a wide range of time-table subjects will be covered. Children come and go; but some activity will present itself which can be completed at short notice if the interest wanes, the children flag, or some of the group are discharged. A wide age-range can work together, and the method gives a creative rather than destructive outlet to pent-up energies of children confined to hospital routine.

Fig. 1—With gloves on, John overcame the fear of the pet grass-snake.

Joining in activities designed to suit their own condition, the children are not put at a disadvantage by their disability. They gain confidence because each can contribute something to the group. They can work at their own pace, and, relieved of the competitive pressure of a large mixed class, may well make up for the schooling they have missed. They become more self-reliant as they develop a feeling of achievement and pride. Moreover, much of the work leads them to explore the resources of the town and country on their doorstep and so make valuable new educational and social contacts. With a small group one can carry out projects impossible in schools. Also, the great interest shown by hospital staff and the local community has provided a wide background for these activities.

For these children a rigid time-table is not only impossible but harmful, because the scheme for the day must meet the special needs of the group at that moment. A well-planned time-table of the night before may have to be abandoned. A death, an operation, new staff or patients, or disturbances since getting up at 5.30 A.M. may have unsettled the whole ward.

Some Activities

One most rewarding venture is the yearly pantomime at Christmas in which every child from the age of 3 takes part. The plays, for instance *Cinderella* and *The Sleeping Beauty*, written by the children as a group, take the form of a traditional pantomime, including dancing,

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Fig. 2—Ward 10's map of Frenchay.

singing, and of course a theme song. There has been great competition to produce the neatest programme and invitation and the most striking poster. The children are allowed to use the hospital stage. Producer, property-man, and stage hands are chosen from the group, and on the great day they are in control of the show. Of the 14 performers last year, not one had acted in a play before, put on make-up, or used a proper stage.

The pantomime is an example of an activity that needs an audience. Besides the creative work which goes into entertaining it, the organisation of the party involves writing and arithmetic. On an open day, such as this, the children find themselves hosts as the world walks in. Aware of the responsibilities they have incurred, the group rises to the occasion, carrying off what is to many of them a new situation with an assurance which surprises themselves and adds to their stature.

We have also invited audiences to exhibitions.

The pottery exhibition came into being after a visit to one at the museum. Luckily, it coincided with clay modelling in handwork. Because of discharges the scheme had to be completed within a fortnight. A short history of the craft was given and the children chose and mounted pictures to show the development of the craft. Posters gave particulars of the event, which was open to the public for a week, and some of the children's work was shown. Visitors were invited to "try to make something" at a table prepared for them. Pottery was lent by well-wishers and samples of craft processes by a local pottery. Notices printed by the children, and a small library of suitable books, were also on view.

Finally, the children were taken to a brickworks some distance away and came back armed with enormous lumps of clay—of a type very suitable for experiments. Peculiar objects were made, fired by the brickworks, and taken home as evidence of achievement by proud owners.

An art exhibition followed closely on the heels of the opening of the Royal Academy one season.

Children's paintings had been kept throughout the year, and a children's committee selected fifty to be hung. These were numbered and catalogues printed. Their posters advertised the coming event, which was to be officially opened by the surgeon of the unit. The committee prepared the room, polished the floor, arranged the flowers, and helped with the hanging. They joined in the agonising experience of the ones chosen to address the assembly, introduce the speaker, and call afterwards for a vote of thanks, in the best Royal Academic manner.

Heralded by exciting posters, summer was once marked by a fete, complete with barrel-organ and monkey, and hand-made goods for sale on the stalls.

There is always a pets' corner in the ward, and the care and observation of its occupants is of great value to these children. The vivarium is exciting and there are frequent pond-dipping expeditions to restock the aquarium. Staff have been tolerant of grass-snakes in trouser pockets and hamsters nibbling biscuits on a bed patient's locker. The library and Nature table are other permanent features in the ward, a centre of interest to newcomers who think they are going to be put to bed and stay there, and a comfort to returning patients.

A visit to the Zoo is a delight to both children and escorts, the keepers allowing the party to go behind the scenes. After one such visit a child remarked, "Why don't we have a Pet Show?" The bomb exploded, the show was on—a never-to-be-forgotten experience! Besides more normal animals, exotically beautiful birds and fish (many prizewinners at fanciers' shows) graced the end of the ward; and the grand finale was the arrival of a lorry-load of animals lent by the Zoo, including monkeys and two laughing parrots. The show aroused great interest among adults as well as children and softened many a heart. Others were only too willing to discuss their hobby or particular pet, and after two hours it had to be closed, and the visitors forcibly ejected.

Two activities, more literary in character, took the children out into the local communities in search of material. On one occasion a booklet about the village was compiled, written, and printed. A group of children aged 10–13 worked on their own. Local firms were approached, and a mill, bakery, and quarry were visited. The group paid these visits alone, with the responsibility of maintaining the social courtesies. Records were made of what they had seen and letters of thanks sent.

The children also decided to write about the walks they knew for the benefit of weekend visitors, and this led to lessons on elementary map work, and a plan of

Fig. 3—Gathering berries for the harvest festival.

Fig. 4—A busy morning at the bank.

the hospital and village was made. From these two projects the idea of the guide-book was born. Part I describes local industries and part II interesting walks, with a short description of the church and stories about the village. Again the children found themselves, note-book in hand, in new social contacts with local people. Finally, the children saw their book being printed on a duplicating machine and were responsible for selling 125 copies and balancing the accounts.

One term we had a weekly ward newspaper.

All news was given verbally or in writing to a member of the committee. Every Monday morning at the conference headed by the editor, an 11-year-old girl, the copy was arranged and blocked for printing. Four children working as a team were able to cyclostyle 30–40 copies in an hour and these were sold next day. For the older children ward news was extended to include a world news scrapbook and a visit to a newspaper office.

Whenever possible, tradition is upheld and festivals celebrated, linking the children with life outside the ward. Every Christmas the children make a crib, also cards, wrapping-paper, and presents. They decorate a tree, hold a party, and give hand-made presents to their parents, and end with carol singing. Autumn was marked by a Harvest Festival, and Halloween and Nov. 5 are eagerly awaited.

These are special festival times with their own magic to offer the child, but they may not perhaps cover the three R's. Here are some examples of popular activities which do.

A general store is a favourite with all ages and develops according to the group. A bank and a bus are usually added. Once a post-office appeared and the children visited a nearby post and sorting office. Back at school they learned how to telephone and send telegrams—all pocket-money was spent that week. They enjoyed lessons on the history of the Royal Mail and began to collect stamps.

Another time a village grew round Mrs. Muggins' Stores. Each child became a character in the village, and Dr. Jones, Mr. George of Dragon Farm, and Miss Smith, the school-teacher, did far more letter-writing and work than John, Henry, and Mary. A large picture map of the village was painted, and houses, farms, fields, and woods were named. The village magazine reported such things as a burglary at the Manor, an accident at the crossroads, a fire, and trouble on Badger's Common with a gipsy encampment, not to mention irate letters from Mrs. Muggins to Miss Smith about her badly behaved children. This project owed a lot to a child who was very active, both mentally and physically, but was confined to bed.

School Report

The activity method does not take up all the school time. The children enjoy routine work for part of the day, or at some time during the week. A weekly record is kept, and time-table subjects omitted or not covered by an activity are inserted to secure a balanced weekly diet of work.

But the physical, and sometimes mental, state of these sick children often makes it impossible for them to concentrate on school work without an absorbing centre of interest to take their minds off their illness. This the activity method provides. It also allows them to go at their own pace and gives the teacher the necessary flexibility in arranging a time-table to suit changing ward conditions and a shifting population.

The children stay for such short periods that it is hard to assess their progress in each traditional time-table subject. It is even more difficult to assess the eventual educational benefits which they receive from their visits, contacts, and researches in the world outside and the activities they organise. But the development of character which this method encourages is more visible. Responsibility and a sense of achievement seem to give more confidence to the shyest child. The children who come to the ward school seem more lively and alert than those who have individual lessons on adult wards.

The therapeutic value of school is obvious. The anxiety of children to be allowed to come back to school after an operation may shorten their convalescence. Often a child too ill to do lessons has pleaded to be wheeled up in bed to the class. Then, satisfied, he falls asleep.

I wish to thank Mr. R. H. R. Belsey, surgeon in charge of the unit, for his interest and support.

Public Health

FRENCH PUBLIC-HEALTH SERVICES

J. S. COOKSON
M.A., M.D. Camb., D.P.H.
COUNTY MEDICAL OFFICER, HEREFORDSHIRE

LAST year I spent two months in France studying the French public-health services. First I spent six weeks in the department of the Aisne where I watched at close hand the working of the ordinary public-health services, and the other medical and social services of a rural county, particularly the public-health centre at Soissons. My last two weeks I spent in Paris studying the administrative arrangements of the French ministry of health.

The central authority in France is the ministry of health, and the minister is responsible for the public-health services to the elected legislative assembly. Outside Paris, the department is responsible for providing the main public-health services. These services are financed partly by the central government and partly by the department, and the commune. The department is advised by the *médecin directeur départemental de la santé*. His terms of appointment are interesting. Though he serves the department, he is appointed by the ministry and is an official of the central government. His duties range from purely advisory functions, so far as hospitals and sanatoria are concerned, to those of an executive nature for public health.

PRENATAL AND POSTNATAL SERVICES

By and large, the public-health services in the department of the Aisne are comparable with those of an

English medium-sized rural county, but there are differences.

In France a premarital examination is compulsory. The engaged couple must have a full clinical examination by their local doctors, supplemented by special examinations to detect tuberculosis and syphilis, the diseases most likely to be transmitted to spouse, or to possible children. If the medical examination is unsatisfactory this is not a bar to marriage, but it gives the doctor an opportunity of explaining the dangers. The certificate does not give any diagnosis, but merely states that an examination has been made. It must be delivered to the official at the registry office. It is difficult to know how useful this procedure is, but it does something to make engaged couples aware of their responsibilities to each other and to future generations.

When the birth of a child is registered, the proud parent is presented by the Mayor with a *carnet de santé*, which is a booklet in which the *assistantes sociales* record physiological or pathological particulars as the child develops. It serves as a useful reminder to a mother with a large family to see that each child has been vaccinated or inoculated against infectious diseases and, not least important, that she has made the proper claims to the *caisses* (government friendly societies), for benefits.

Vaccination against smallpox is compulsory and it is supposed to be carried out during the first year of life. Combined inoculation against diphtheria and tetanus is also compulsory between the ages of 12–18 months. In practice, doubtlessly a number of children do not receive these prophylactics at such an early age, but there is a useful check when the child goes to school, since he will not be accepted unless he has been vaccinated against smallpox and immunised against diphtheria.

SCHOOL HEALTH SERVICES

This service is under the department, but it is completely separate from the other health services. The compulsory school-age is 6–14 years; actually many children of 4 and 5 years of age attend and there seems to be adequate accommodation for them. There is no school on Thursdays, but all day on Saturdays. This mid-week break is appreciated by children and staff alike.

All children are medically examined every year at school. The examinations are made at great speed, 30 per hour, giving a total of up to 120 a day. An *assistante sociale* visits the school the day before, weighs, measures, and examines the child for personal cleanliness. The medical officer with whom I worked insisted on each child being stripped, which is by no means the universal practice in England.

Many children came from poor homes, but I saw few flea-bites or verminous heads.

The medical officer was helped by two *assistantes sociales*. One completed the medical cards and the other wrote a letter to the parents of each child, even if all was well. If necessary a personal letter was also sent for the parent to take to the family doctor.

It is compulsory for all teachers to be medically examined on entering the profession. I watched teachers having their annual X-ray chest examinations by the tuberculosis officer. Much importance is attached to these examinations.

Where children are living in overcrowded conditions, particularly in the larger towns, arrangements are made for them to spend the summer holidays in *colonies de vacances*. These are for children between the ages of 6–14 years. The colonies are in large country houses, which may be used for other purposes outside the holiday season. There are also *colonies sanitaires*, which are open all the year round for debilitated and convalescent children of all ages. Their aim is prevention rather than cure.

I found an excellent *centre de l'orientation professionelle* at Soissons run by a psychologist. His main job was to place school-leavers at 14 years of age. He interviewed only those children whose parents wanted his advice. He examined the children by standard intelligence and vocational tests. Later he asked the parents to come with the child for a discussion. He put the parents in touch with training centres for boys, usually at Lille, and for girls at Rheims. He explained to me that in France most girls wish to become good wives and mothers, so they prefer good domestic training.

SOCIAL WORKERS

In England we are trying to define the kind of health and welfare worker best qualified to meet the needs of the family efficiently yet with the greatest economy of time, money, and woman-power. Our problem is to have home visits made by a social worker experienced in a particular branch of social work and yet avoid a multiplicity of visits by specialised social workers. The experience of France with *assistantes sociales* merits serious attention.

The training, final examinations, and registrations of the *assistantes sociales* are under the direct control of the ministry of health, even where the training is given in schools which are not their direct responsibility. Girls who take up this work are advised first to take their full nurses' training course, which in France lasts only two years. After this training they have an eighteen-month course rather similar to our own health-visiting course. The theoretical part of the curriculum is standardised for all students, but each student is allowed to choose which type of practical work she wishes to do. She is thus able to specialise at an early stage in the branch of social work which she intends to do after qualification. The tutors encourage students to undertake work for which they are likely to have some aptitude.

On the face of it, this form of training seems to work out well in France. It would be less suitable for England because the *assistantes sociales* are not trained in midwifery, and the coördination of the domiciliary midwifery and district nursing in rural England has much to commend it.

AN EXPERIMENT IN PUBLIC-HEALTH RESEARCH

In 1949, as part of the programme of post-war reconstruction, it was decided to set up in the region of Soissons, with a population of 150,000, an experimental centre of public health. It was felt that the first step must be to improve, extend, and coördinate the existing services so that this part of rural France would be not only up to normal standard but even something of a show place. The hope was that, when this had been achieved, the centre could be used for educational purposes.

The centre is now open, and Dr. Lataillade, the medical director, has wisely established his offices within the curtilage of the Soissons Hospital. The centre is superimposed on the existing public-health organisations and receives considerable financial upport from the Rockefeller Foundation, the World Health Organisation, and the International Children's Fund. Its functions are varied and, so far as France is concerned, experimental. At the time of my visit they included the following:

Regular monthly talks on topical medical matters. I had the privilege of hearing one given by Professor Thieffry, of the Faculty of Paris, on poliomyelitis. These talks are well attended and are common meeting-ground for doctors in all branches of the profession within reasonable access of Soissons.

A pædiatrician from Paris visits the centre each week, mainly to see cases referred to him from the "well baby clinics."

Surveys are made on special public-health problems. At the present details about all physically handicapped persons in the department of the Aisne are being collected. In view of the special problems of France, this is not so easy as it would at first appear.

A mass miniature-radiographic survey was being made of the hospital staffs in Soissons and the surrounding villages, where it was thought that there was an undue prevalence of pulmonary tuberculosis. The apparatus had been presented by UNICEF.

Regular statistical analyses are made of vital statistics. A statistician comes from Paris to advise on this work and to guide research into useful channels.

A child-guidance centre has been set up staffed by two psychiatric social workers, a part-time visiting educational psychologist and a psychiatrist. This service is in its infancy in France.

There are obvious difficulties in grafting a public-health centre on to existing public-health services. But there are advantages in having a centre, properly staffed with trained workers who have time for original research without being unduly concerned with routine administration. Perhaps in the future the centre will be useful as a postgraduate institute where French and foreign workers, particularly from underdeveloped countries, will study rural public-health administration.

GENERAL PRACTICE

French general practitioners all seem to be strong individualists, sensitive to, and much against, any interference from the State. There is a powerful professional body, known as the Syndicate, which deals with professional matters and which is held in respect by all doctors. There is also a committee which is an official body and is said to deal with disciplinary matters.

A usual charge in the country for a consultation at the surgery is about 8*s*., and for a visit about 12*s*., depending on the mileage. The patient pays the doctors and then recovers from one of the government friendly societies—the *Caisse de Société Général* in the town, or the *Caisse de Mutuelle Agricole* in the country. If the patient is unable to pay, the doctor gives him free medical care, and himself recovers the fee from *Assistance Médicale Gratuite*, which is something like our old parish relief.

A high proportion of pharmacists have been trained in laboratory investigations. Behind the ordinary chemist's shop it is usual to have one side devoted to dispensing and the other to laboratory work. This service is extremely popular with the local doctors who often need simple laboratory investigations but have not the time to undertake them. All pharmacists are registered by the department and a control is kept on their prescriptions by occasional reference for analyses to Paris. The patient pays the chemist when he collects his medicine and recovers a proportion (not exceeding 80%) from the government friendly societies. If the patient is unable to pay, the chemist supplies him with the medicine and himself recovers the fee from the *Assistance Médicale Gratuitie*.

Spectacles are usually prescribed by an ophthalmic practitioner and made up by an optician. He orders them from a factory, but takes an interest in selling the most suitable frames to the patient. The government friendly societies contribute up to a quarter of the cost for approved lenses and frames.

INDUSTRIAL SERVICE

The industrial medical service is well developed, and all factories, both public and private, must have adequate medical and ancillary services. In Soissons, with a factory population of 5000, there were two whole-time factory doctors. All young people aged 18 years were medically examined before beginning factory work, and all workers were examined annually. They came, so far as possible, to the industrial medical centre, which was reasonably well-equipped with a laboratory and an X-ray unit. The two doctors also visited regularly all factories to inspect industrial hazards. Each large factory had one or two trained nurses. Where home visits are required for welfare purposes, these are made by the *assistantes sociales* of the department.

CONCLUSIONS

The French medical services are different from ours, and perhaps we have something to learn from them, though what is suitable for France is not necessarily ideal for England.

Their school health services are not so well developed as ours.

The work of the *assistantes sociales* is important. It is preferable to have only one social worker visiting the home if she can call on specialist advice.

The public-health research centre at Soissons is an interesting experiment, for it has money, trained workers, and time to spend on research.

I am indebted to the Ciba Foundation and the National Institut d'Hygiène of France, for grants which made my visit possible.

The Rôle of Local-authority Clinics

A good deal of thought continues to be given to the future of local-authority clinics and the place they should occupy in the health service. Quite apart from the discussions on how these centres may play a part in the prevention of mental ill health, there is no lack of suggestions for other, though more minor, rôles they might assume.

Recently the Middlesex County Council asked the Minister of Health's permission to allow patients other than expectant mothers and young children to attend its municipal clinics.[1] The proposal arose, apparently, from a request by a general practitioner that one of his asthmatic patients should attend such a clinic for breathing exercises. The Minister, it is understood, would not sanction this; and the *Municipal Journal* expresses disappointment at his refusal to approve a scheme which would have fostered coöperation within the National Health Service, and would have eased the strain on hospital outpatient departments.

The relaxation classes which many municipal clinics hold for expectant mothers are open to the patients of general practitioners, and to hospital patients, as well as to those booked with local-authority midwives. Moreover, local authorities, through their close association with the work of hospitals, are also interested in patients with asthma—particularly those who, at the request of a hospital consultant, are put under the care of a health visitor. It seems reasonable, then, that a general practitioner should be allowed to send his asthmatics to the welfare centre for suitable exercises.

The Minister, however, evidently thinks that schemes such as the one suggested by the Middlesex County Council would lead to too great a similarity between the clinics and the hospital outpatient department—diminishing their emphasis on prevention. His apparent intention to keep the control and operation of physiotherapy within the hospital service may in fact be wise. There is much new ground to be covered in the promotion of better mental, social, and physical health, and those who are planning the future activities of the clinics need have no lasting regrets at his refusal to let them do work which properly belongs to the hospital outpatient department.

1. *Municipal Journal*, Feb. 11, 1955.

In England Now

A Running Commentary by Peripatetic Correspondents

IT is a sad thought that after many centuries the natural dyes are giving ground to the synthetic products of the chemical industry. It is only a matter of time, I suppose, before the lore so carefully handed down by word of mouth for countless generations is lost; for instance, there must be few people nowadays with expert knowledge of the growth and preparation of woad.

Gone too are the days when dyestuffs were sent as tribute from vanquished to vanquisher. Factories, industrial secrets, or atomic scientists are the modern counterpart of the insect dye kermes which the Romans exacted from the defeated Spanish tribes. Oddly enough the Spanish got their dye back centuries later from the New World as cochineal, which is related to kermes and a better dye to boot. Stout Cortez, who found the Aztec chief, Montezuma, exacting it from subject tribes, was not slow to learn from his example and bring some back to Spain. He started a prosperous trade which gradually ousted the Old World dye. All this only goes to prove once again that human nature is much the same the world over—whether Roman, Castilian, or Mexican Indian—and a nice splash of colour is almost a psychological necessity for our well-being.

* * *

Matron has a healthy contempt for the psychs. I first became aware of this when I asked if I might bring a friend, a child-guidance specialist, to see her residential home for three-to-five-year-olds. Sensing a certain resistance, I did not press the issue.

Apparently a few months ago, a "rationalisation" of psychs descended on her establishment. Among other things, they recommended that the children should not be taught to say "please" and "thank you"; that there should be no control over their comings and goings from the house or grounds; and that sit-down meals should be replaced by a running buffet. Matron is not prone to indecision. She announced that, unless all the recommendations were rescinded at once, she would resign.

Matron is still there, and the children remain happy, healthy, and uninstitutional—even though I am their "father figure."

* * *

All day Sunday I had been feeling off colour; shivery, myalgic, with a nagging discomfort below my right ear. Monday is an early-rising morning, and at 7 A.M. I became conscious of the noise of the alarm, and pain below and medial to both ears simultaneously. I stretched and yawned—and shut my mouth very quickly and hastily palpated my jaws. After a horrified look in the mirror, I returned to bed announcing firmly that I was unfit for professional duties or domestic chores, and, no, I didn't know who was going to drive young Patrick to school.

A few hours later the family doctor confirmed the diagnosis by examination from the doorway, left an insurance certificate, and asked me if I knew the complications. He could be heard chuckling all the way to his car. Since then I have telephoned, or been telephoned by, about half a dozen colleagues, and have had the comments of perhaps a dozen more reliably reported. I have to record a high degree of sadism in the medical profession in this county. This sadism may be overt, shown mainly by surgeons ("wait till the complications get you" theme); may be disguised as helpful advice, usually from physicians ("Heroic doses of wide-spectrum antibiotics *may* abort painful complications"); or may present as *Schadenfreude* in the uproarious Rabelaisian laughter of hearty G.P.s.

There must be a paper somewhere in all this—but can anyone tell me, is orchitis really so *very* painful?

* * *

I have just realised that, as an incomer to the North of England, I have been using a phrase which is open to misinterpretation by the wearers of white or red roses. In seeking for the elusive inferior border of the liver and the furtive lower pole of the spleen, I have always urged my patients to breathe deeply. I have encouraged them by uttering rhythmically the monosyllabic instructions "In! . . . Out!" "In! . . . Out!" I have long been puzzled by their response.

Myself: "In! . . . Out!" Patient: "No, doctor."
Myself: "In! . . . Out!" Patient: "No, doctor."

An so on *ad infinitum*, almost *ad nauseam*. The other day light broke when I heard one patient adjuring another with the well-known words, "If ever tha' doost owt for nowt, do it for thee'sen."

* * *

We are often told that there is nothing new under the sun, but it came as a shock to read in *The Boke of Knowledge* (1535) a clear description of a method developed in the late war for the estimation of specific gravity of blood:

"For to know whether ye shall die within xii months or not, let a drop of your blood fall into a dish of water, and if it descend whole into the bottom, ye shall live that year, and if not but go abroad, not."

The "dish of water" is a little disturbing, but maybe there was enough copper or other metallic contaminant in any one area to give a reasonable result.

* * *

There can be no question that my general health has improved, because people often remark how well I look. My appetite, always hearty, has increased and I have gained half a stone in weight. Between meals I eat sweets. No longer do I get those troublesome extra-systoles. I have no morning cough and my eyesight is, I fancy, keener. On the other hand that tendency to drowsiness in the afternoon has not abated, nor has that uninvestigated epigastric discomfort two hours after meals. Poetic inspiration is at a standstill and the creative impulse sadly lacking. Melancholia is profound and increasing, and evenings are so full of longueurs that, unable to read or write, one goes early to bed.

Yes, I've given it up: I smoked my last pipe on Jan. 11.

* * *

Like myxomatosis, it's getting nearer. It started about three years ago in the new building estate and quickly spread to the council houses in the village. Now it's all along the roads at the back of the station. It has even appeared in some of the hotels on the Beacon. The district nurses have got it, but so far the hospital and all save one of the local G.P.s have escaped. It's in the gardener's cottage at the top of the lane. My daily woman has it in her kitchen, and my 95-year-old cardiac patient was one of the first victims.

Having kept free for so long I thought I was immune; but my housekeeper has just told me that her television set is ordered, and "Will it be all right if the aerial is put up this week?"

* * *

It is not often that our patients advise us how to fill in their death certificates, but I have lately been offered some help of this kind. I may add that the patient has every prospect of surviving for some years yet, though according to his letter he has already undergone two deceases. He writes:

SIR,—Before making out Death Certificate certifying the cause of my Death, would you kindly study carefully my history of Medical and Operational also X-Ray reports appertaining to my Hospital treatment which spreads over a period of years.

You will note that my leg as caused me trouble from 1926 and my pensionable decease from 1917.

Therefore I am of the opinion these two deceases will eventually cause my passing away, and should this be so then it is hoped that you will make out the Death Certificate to certify:

(1) Leg.
(2) Pulmonary Emphsema with Fibrisis Non T.B.

Thanking you,
Yours Faithfully,
(Signed) Late M. Smith.

Letters to the Editor

COUNTING THE SWABS

SIR,—I think the time has come when an authoritative body representative of surgery in this country should examine and declare its views on the question of the surgeon's responsibility for the swabs used during an operation. The position at present is confused. The judges are laymen and they look to the learned professions by way of expert evidence for guidance in matters which are individual to each profession.

I hold strongly to the view that the accuracy of the swab-count at the end of an operation should be wholly the responsibility of *one person*. I feel that there is danger in the knowledge of a shared responsibility, and that so long as this is the case the absolute care required for safety will not always be exercised by all individuals. In my view the responsibility should be the theatre sister's (nurse taking the case). She alone knows how many swabs and packs she started with or were added during the operation, and therefore she alone is in a position to make the count at its termination. It is unreasonable that a surgeon carrying out a long or difficult operation should at the same time be required to take, and legally be held to share, the responsibility for the accuracy of the swab-count at its termination.

The surgeon's responsibility during an operation is in my opinion to exercise an over-all supervision, the nurse's responsibility is more particular and confined. The surgeon at the beginning of the operation should satisfy himself that the system dealing with the swabs is an accepted one and that the nurse concerned has had the necessary experience. At the end of the operation he must inquire if the swab-count is correct, and if it is not it is clearly his responsibility to search for the missing swab in the operation area, and it is his responsibility to decide when that search should be abandoned if it is unfruitful. He should also be expected to help and coöperate with the nurse taking the case in every way possible—for example, he should never take a swab direct from her table.

It is on the vexed question of divided responsibility for the swab-count that an authoritative statement is required. I submit that the obvious representative body to review this subject is the council of the Royal College of Surgeons in suitable consultation with the Royal College of Obstetricians and Gynæcologists and representatives of the Nursing profession.

London, W.1. VICTOR H. RIDDELL.

DANGER OF VITAMIN K TO NEWBORN

SIR,—I wish to draw attention to the possible danger of administering unnecessarily large doses of water-soluble vitamin-K analogues to premature infants.

I have recently investigated a small series of cases of kernicterus and hæmolytic anæmia in premature infants whose only treatment had been relatively high doses of a water-soluble vitamin-K analogue ('Synkavit') for hæmorrhagic disease. There was no evidence of Rh incompatibility in any of these cases. It has since been found that administration of various water-soluble vitamin-K analogues in relatively high concentrations to rats can cause hæmolysis. The hæmolysis is very severe in animals on diets deficient in vitamin E; and the fact that newborn infants, in particular premature infants, are low in this vitamin may predispose them to hæmolytic disease.

Clinical and laboratory experience has indicated that doses of synkavit of the order of 5 mg. per day by injection are quite adequate for treating hæmorrhagic disease of the newborn. There is, however, a widespread tendency to use much higher doses in the belief that this vitamin is innocuous under all circumstances. Whilst there is no evidence to suggest that serious hæmolysis occurs in conditions other than prematurity, it does seem that doses in excess of 5 mg. per day by injection in premature infants, in whom low vitamin-E levels are common, are unnecessary and potentially dangerous.

Clinical Pathological Laboratory, Radcliffe Infirmary, Oxford. A. C. ALLISON.

ISONIAZID RESISTANCE

SIR,—We wish to comment on the excellent editorial in your issue of Jan. 29.

First, and in particular, reference was made to the observations of Katz et al.,[1] which at first sight may appear to have a bearing on the problem of pathogenicity of isoniazid-resistant mutants of typical mammalian-strain tubercle bacilli for human beings. We would like to add emphasis to the criticism already succinctly cited in your editorial that the "strain" isolated from their patient was inhibited by a combination of very low concentrations of isoniazid and streptomycin in vitro.

Katz et al. were unable to account for this inasmuch as they believed they had ample evidence of total resistance to high concentrations of isoniazid alone and of streptomycin alone. Several experiments in our laboratories have shown that a population of tubercle bacilli in which all or nearly all of the bacterial cells are separately resistant to both isoniazid and streptomycin are not inhibited by a combination of low concentrations of both drugs. In culture-media containing such combinations they are inhibited only by concentrations of either drug which are inhibitory in the absence of the other drug. In other words, there is no significant bacteriostatic synergism between isoniazid and streptomycin for tubercle bacilli. It is evident, therefore, that Katz's "strain" was a mixed population of drug-susceptible and drug-resistant tubercle bacilli; probably the former organisms were masked by too large inocula in the performance of drug-resistance tests.[2] It was for the purpose of avoiding such clinically important errors that methods [3] were devised for fuller quantitative investigation of the bacillary populations in sputum. It is only fair to note that these authors may have failed to take into account the fact that large challenge doses of pure populations of isoniazid-resistant mutants may induce gross primary tuberculosis in normal guineapigs which regresses after the first few weeks of infection.[4 5] Be that as it may, the apparently high pathogenicity of their presumably isoniazid-resistant "strain" for guineapigs also shows that their clinical observations have no pertinence to the question as to whether or not guineapig-attenuated, isoniazid-resistant mutant strains of tubercle bacilli are pathogenic for man.

It seems fair to conclude that the observations of Katz et al. have little to offer concerning the clinical implications of microbial resistance to isoniazid in tuberculosis.

The communication which you cited from Medical Research Council workers [6] concerned itself with the possibility that patients with resistant strains in the sputum at the time of discontinuation of isoniazid therapy might more rapidly become culture-negative, or, at least, resistant-strain-negative, "if resistant strains were less pathogenic in the environment in which they originated."

Analytically difficult problems are posed by the techniques of drug-resistance tests, the possible subsequent breakdown and ulceration of lesions which harbour metabolically quiescent, drug-sensitive bacilli during the period of therapy, and the possibilities of reverse-mutation. Aside from these, there exists the basic question as to whether the clearly evident ability of catalase-negative strains to continue proliferation in the peculiar environment of the open pulmonary cavity—the environment in which they obviously originate—can really be viewed as having any import with respect to their pathogenic potentialities compared with those of the parent catalase-positive strains from which they derive.

1. Katz, S., Storey, P. B., McCormick, G. F. *Amer. Rev. Tuberc.* 1954, **70**, 881.
2. Middlebrook, G. *Ibid*, p. 922.
3. Middlebrook, G., Cohn, M. L., Schaefer, W. B. *Ibid*, p. 852.
4. Karlson, A. G., Ikemi, Y. *Proc. Mayo Clin.* 1954, **29**, 119.
5. Mitchison, D. A. *Brit. med. Bull.* 1954, **10**, 115.
6. *Thorax*, 1954, **9**, 254.

We have been interested in this problem and have presented some of our clinical observations in a communication to appear in a forthcoming issue of the *American Review of Tuberculosis and Pulmonary Diseases*.[7] It is conceivable that too little emphasis has been placed upon the following:

(1) The probability [8 9] that isoniazid-resistant, catalase-negative mutants of tubercle bacilli find only in the medium of autolysing leucocytes in open cavities the dissolved catalase needed for their multiplication in vivo.

(2) The fact that isoniazid can safely be administered to tuberculous patients in doses of 8–16 mg. per kg. per day (except in grossly obese individuals) provided pyridoxine is simultaneously administered in doses of 25–100 mg. per day.[10 11] Approximately 300 tuberculous patients have been treated at our hospital on such regimens for the past year with no instance of peripheral neuropathy, and with no instance of catalase-positive resistant bacilli appearing in cases initially treated on such regimens.

(3) The arrest of progressive lesions in some patients upon increase in dosage of isoniazid from the range of 2–4 mg. to 8–16 mg. per kg. per day,[12] an observation also made in several patients in our hospital. This interruption of a "downhill course" in such circumstances is easily explained. It may reasonably be attributed to inhibition of further multiplication of catalase-positive drug-susceptible, or weakly drug-resistant, organisms in individuals who acetylate the drug [13] or otherwise render it antimicrobially inactive to such a degree that the lower dosage is not actually chemotherapeutically adequate. Some authorities [14 15] still have many patients under their care "who are dying of progressive tuberculous infection with these isoniazid-resistant, avirulent bacilli" while under treatment with 2–4 mg. of isoniazid per kg. per day: perhaps dosage of the drug is important.

Many intriguing phenomena make mandatory a clear definition of the problem of microbial mutation to isoniazid-resistance from the bacteriologic point of view. To cite just one example, there exist morphologically or chromogenically "atypical" tubercle bacilli, isolable in pure culture from the sputa and resected lung specimens of a small percentage of tuberculous patients, which are natively at least ten times less susceptible to isoniazid in vitro and natively non-pathogenic for guineapigs. Such strains in our experience are very strongly catalase-positive; and so are their isoniazid-resistant mutants. The clinical significance of isoniazid resistance cannot be settled without valid qualitative and quantitative bacteriological and biochemical data. Hypnotised, as it were, by the historically ominous clinical implications of drug resistance and of a persistently positive sputum, we, like many others, were foundering at the clinical level, until relationships were established between clinical dosage of isoniazid, "one-step" mutation to high resistance to this agent, bacterial catalase deficiency, and attenuation for laboratory animals.

In conclusion, we suggest that the pertinent question to be settled with regard to this aspect of the chemotherapy of tuberculosis may fairly be framed as follows: Are isoniazid-resistant, catalase-negative strains of tubercle bacilli per se attenuated for man; and, if so, in what respects? We are very gratified to note that British investigators consider this a question deserving serious study. Suffice it to remark that, presumptuous as our convictions in this matter may have appeared, further experimental studies in our laboratories with hamsters as well as with guineapigs, rabbits, and mice, and with rhesus monkeys in the Christ Hospital Institute for Medical Research at Cincinnati by Schmidt et al.,[16] have strengthened those convictions: only for mice—and only for certain strains of mice, challenged by certain routes—are catalase-negative strains of tubercle bacilli significantly pathogenic.

The National Jewish Hospital, and The University of Colorado School of Medicine, Denver 6, Colorado.

G. MIDDLEBROOK
S. H. DRESSLER.

7. Oestreicher, R., et al. *Amer. Rev. Tuberc.* (in the press).
8. Middlebrook, G., Cohn, M. L. *Science*, 1953, **118**, 297.
9. Cohn, M. L., Kovitz, C., Oda, U., Middlebrook, G. *Amer. Rev. Tuberc.* 1954, **70**, 641.
10. Biehl, J. P., Vitter, R. W. *Proc. Soc. exp. Biol., N.Y.* 1954, **85**, 389.
11. Oestreicher, R., Dressler, S. H., Middlebrook, G. *Amer. Rev. Tuberc.* 1954, **70**, 504.
12. Costelletos, E., Nassainas, A. *Rev. Tuberc., Paris*, 1954, **18**, 1091.
13. Hughes, H. B., Schmidt, L. H., Biehl, J. P. Transactions of the 14th Conference on the Chemotherapy of Tuberculosis, Atlanta, Ga., February, 1955. In the press.
14. Schwartz, W. S. *Ibid.*
15. Hinshaw, H. C. *Ibid.*

SANATORIA

SIR,—I have followed the correspondence on this subject with some anxiety. Is this advocacy of domiciliary treatment of pulmonary tuberculosis being carried too far? Is it, perhaps, prematurely spreading to such an extent that many of our so-called "country convalescent homes capable of caring for coughing consumptives" will, in the near future, be closed down, converted to some other use, and irretrievably lost to the service of the tuberculous?

Yes. These "coughing consumptives" may prove to be a much bigger problem than they are at present. The general hospitals will certainly not want to have anything to do with them. Our present enthusiasts may regret, at no very distant date, that they burned their boats, as they are indirectly doing at this moment, before their experimental treatments have stood the test of time.

Barton-on-Sea, Hampshire.

R. S. CALDWELL.

CLINICAL STAGING OF CARCINOMA OF THE BREAST

SIR,—Those who work among cancer patients are be increasingly aware of the difficulties of comparing the results of treatment methods, owing to the lack of agreement about staging this disease. The cervix uteri is the only site for which an international staging exists, and it is a reproach to cancer specialists all over the world that in the last twenty-five years there has, until recently, been no real effort to do the same for other sites.

At the sixth congress of the Union Internationale Contre le Cancer held in Brazil in July, 1954, the staging of carcinoma in several sites was discussed—e.g., the breast, larynx, and pharynx. Oddly enough, the staging of cancer of the larynx, which is a rare disease and which is treated on a large scale in comparatively few centres, provoked long and even acrimonious discussion. By contrast, breast staging was the subject of a number of proposals but these aroused little interest and scarcely any debate.

It seems to many of my colleagues at the Royal Marsden Hospital (formerly the Royal Cancer Hospital) that international agreement on the staging of breast cancer is more urgently required than for any other site in the body, for the following reasons:

1. The high incidence of the disease.
2. The large number of clinicians treating the disease.
3. To discover the effect of any one treatment upon the disease so that different methods of treatment can be compared.
4. Because the comparatively high survival-rate would surely make this comparison worth while.
5. Because there seems to be a more reasonable hope of achieving earlier diagnosis in cancer of the breast by appropriate propaganda than in most other cancer sites, and therefore it is important to try and find out whether such propaganda would succeed in improving the results of treatment.

No doubt the World Health Organisation is the proper body to decide the matter, and only they can effectively advise the universal adoption of a staging which will inevitably dissatisfy many people. The next meeting of

16. Schmidt, L. H., Hoffman, R., Jolly, P. N. *Ibid.*

the International Union against Cancer is in London in 1958. Is it too much to hope that before then British surgeons and radiotherapists may have met and discussed and agreed upon a clinical staging for carcinoma of the breast, so that the clinicians of this country at least can put forward a basis for discussion which already commands firm support ?

This letter is written in the hope of stimulating interest and action ; and to say that the Royal Marsden Hospital is willing to take the initiative in arranging such meetings of clinicians as would be necessary to determine this matter if no official body is likely to do so in the very near future.

Royal Marsden Hospital, London, S.W.3. MICHAEL HARMER.

THE LOWENFELD MOSAIC TEST

SIR,—It was pleasant to see the review of my book in your issue of Feb. 12. Since it appeared, however, it has been pointed out to me that the impression given by the review is that the test is mainly suitable for use with children. I would like, therefore, to explain that this is a misunderstanding as the test is of very wide application, particularly useful in consultation work. The experience reported in the book is on work with adults, normal, neurotic, and psychotic, and on the use of the test as a cross-cultural tool, as well as for children.

London, W.11. MARGARET LOWENFELD.

RETROLENTAL FIBROPLASIA

SIR,—Ashton et al.[1] found experimentally that exposure to a high concentration of oxygen was the most important cause of retrolental fibroplasia. Clinical observations on premature infants have confirmed these findings, but the mechanism of the obliterative changes in the retina, and the nature of the stimulus which in the later stages of retrolental fibroplasia forms pathological vessels, are still unknown. Taking note, however, of the work of Warburg et al.[2] on metabolism in the retina and of the investigations of György et al.[3] into the special features of the metabolism of growing organisms, it is possible, I think, to deduce something of the pathogenesis.

Warburg showed that the retinæ of frogs, rabbits, and rats have a high rate of anaerobic glycolysis. György et al. found that the lactic-acid levels in the blood (an index of the degree of glycolysis) are higher in premature infants than in full-term babies, and higher in full-term babies than in older infants. Further, we have found, using Warburg's apparatus, that the rate of anaerobic glycolysis in the kidneys of suckling rats is higher than in adult rats. Warburg pointed out (*a*) that anaerobic glycolysis diminishes or disappears when the oxygen-supply increases; and (*b*) that growth is impossible without glycolysis.

From these facts it follows (*a*) that anaerobic glycolysis is essential to the retina and must be maintained (this is especially necessary in growing organisms with a high rate of anaerobic glycolysis) ; and (*b*) that if the oxygen tension rises above normal, the retinal arteries of a premature organism constrict to reduce the oxygen-supply. In more mature organisms in which the retina is fully developed, and in which the rate of glycolysis is much lower, this reaction does not occur, because in them the oxygen increase is not so dangerous. Constriction of the retinal vessels impairs the nutrition of the retina and ultimately damages it. Vascular budding and the formation of connective tissue are secondary effects, which appear when the organism returns to a normal oxygen concentration.

This hypothesis, which is shortly to be published [4] in greater detail, explains why the effect of oxygen in causing retrolental fibroplasia is proportional to the degree of immaturity of the retina, to the duration of exposure to oxygen, and to the concentration of oxygen.

Brunswick, Germany. TH. BREHME.

1. Ashton, N., Ward, B., Serpell, G. *Brit. J. Ophthal.* 1953, **37**, 513 ; *Ibid*, 1954, **38**, 385, 397, 433.
2. Warburg, O., Negelein, E., Posener, K. *Biochem. Z.* 1924, **152**, 309 ; *Ibid*, 1925, **165**, 122.
3. György, P., Brehme, Th., Brahdy, M. B., Keller, W. *Jb. Kinderheilk.* 1927, **118**, 178 ; *Ibid*, 1928, **120**, 42 ; *Biochem. Z.* 1928, **200**, 356.
4. *Disch. med. Wschr.* (in the press).

ESCHERICHIA COLI IN INFANTILE DIARRHŒA

SIR,—Since June, 1952, we have been investigating the relationship between *Escherichia coli* and infantile diarrhœa. Some of our findings have already been published in your columns.[1 2] This letter deals with the results obtained from the start of our investigation to the end of March, 1954.

The infants investigated were from the infants' home of our university here in Nagoya. Approximately equal numbers of male and female infants were included, all under two years of age, and most of them more than six months old. All were artificially fed. Antibiotics were used in 1952 because of the severity of the disease, but since then the cases of diarrhœa have been mild, and antibiotics have not been given.

Rectal swabs were investigated for *Esch. coli* O–111, B4 and O–55, B5 from June, 1952 onwards ; O–26, B6 from October, 1952 ; O–86, B7 from August, 1953 ; O–25 from July, 1953 ; O–44 from September, 1953 ; and O–102 from October, 1953. Usually the fæces were examined weekly, but during epidemics more frequent examinations were made. The results are summarised in the accompanying table.

No *Esch. coli* O–111, B4 were isolated in 1952, and all cases related to this strain occurred in 1953. *Esch. coli* O–55, B5 were isolated from the start of our investigations, and in 1952 there were two epidemics in the home which were related to this strain.[1 2] After the epidemics of 1952 *Esch. coli* O–55, B5 were isolated occasionally, but in smaller numbers, and there was a period of about four months in 1953 during which they were not isolated at all. *Esch. coli* O–26, B6 were isolated mainly in the summer of 1953.

Esch. coli AND INFANTILE DIARRHŒA

Strain	No. of cases in which isolated	Severity of disease	Relationship between *Esch. coli* and diarrhœa		
			Definite	Doubtful	None
O–111 ..	11	Severe	0	0	3
		Moderate	0 } 5	1 } 3	
		Mild	5	2	
O–55 ..	29	Severe	4	0	5
		Moderate	7 } 22	1 } 2	
		Mild	11	1	
O–26 ..	13	Severe	0	0	4
		Moderate	1 } 6	1 } 3	
		Mild	5	2	
O–86 ..	27	Severe	0	0	8
		Moderate	3 } 10	3 } 9	
		Mild	7	6	
O–25 ..	3	Severe	0	0	1
		Moderate	0 } 1	0 } 1	
		Mild	1	1	
O–44 ..	14	Severe	0	0	7
		Moderate	0 } 0	2 } 7	
		Mild	0	5	
O–102 ..	5	Severe	0	0	4
		Moderate	0 } 0	0 } 1	
		Mild	0	1	

A close relationship between the bacilli and the infantile diarrhœa was observed with the three strains, O–111, B4, O–55, B5, and O–26, B6.

The relationship of *Esch. coli* O–86, B7 to infantile diarrhœa was first noticed by Braun [3] in Heidelberg. In our investigations this strain was isolated in large numbers in 1953, and was the strain most frequently isolated that year. A close relationship between it and the disease was observed.

A relationship between *Esch. coli* O–25 and infantile diarrhœa was first noted by Ocklitz and Schmidt [4] in Rostock. Our observations seem to confirm their findings, but we would

1. Ogawa, T., Ogawa, J. *Lancet*, 1953, i, 602.
2. Ogawa, T., Ogawa, J. *Ibid*, 1953, ii, 1266.
3. Braun, O. H. *Ergebn. inn. Med. Kinderheilk.* 1953, **4**, 52.
4. Ocklitz, H. W., Schmidt, E. *Arch. Kinderheilk.* 1954, Beiheftе no. 28, p. 106.

need more evidence before we could draw valid conclusions. Similarly, we are continuing our investigations on *Esch. coli* O–44 and *Esch. coli* O–102.

It should be noted that there were cases in which no relationship was established between the strain isolated and the occurrence of diarrhœa. The proportion of such cases was 27% in *Esch. coli* O–111, B4 cases; 16% in O–55, B5 cases; 30% in O–26, B6 cases; 30% in O–86, B7 cases; and 33% in O–25 cases. On the other hand, 50% of the O–44 cases, and 80% of the O–102 cases, were unaffected by diarrhœa due to these strains.

Last year we also cultured *Esch. coli* from the infants' fingers, toys, diaper-covers, and bed-sheets, and from the rails of their beds. The strains isolated were those commonly found in the fæces at that time.

It was noted that almost all newly admitted infants became infected with *Esch. coli* soon after admission—usually within three months. The strains isolated were those most prevalent at the time. Those observations suggest that the infection was spread by contact; but spread by droplet infection cannot be excluded, since the prevailing strains were obtained from nasal swabs taken from the infants.

During the two years of our investigation different strains of *Esch. coli* predominated. In 1952 O–55, B5 was isolated in large numbers, and apparently caused two epidemics; but the organisms decreased in number during 1953, when O–86, B7 became the most prevalent strain. O–111, B4, which was not detected in 1952, appeared occasionally in 1953. In severe epidemics, the strains which were isolated usually belonged to one definite group; but in a sporadic outbreak many different strains were isolated simultaneously. Infants who stayed for long periods in the home became infected with several strains in turn—e.g., one infant was infected with O–55, B5 in July, 1953, with O–111, B4 in September, and with O–86, B7 in November of the same year.

Nagoya City University, Japan.

TOHRU OGAWA
JIRO OGAWA.

SICKLE-CELL TRAIT IN SOUTH TURKEY

SIR,—Last week's interesting article by Dr. Aksoy on the sickle-cell trait in Turkey links the Eastern Mediterranean with Greece, Italy, and (what may not be generally known) with Portugal in this respect. On a recent visit to Portugal I was interested to hear from Prof. Carlos Trincão that some of his patients with sickle-cell anæmia come from an area to which in the 18th century African slaves were sent to help in the drainage of swamps.

Miss Cutbush and I did not want to suggest that the sickle-cell trait was introduced into Africa by Indian tribes. No doubt we must take some responsibility for this misunderstanding, since it occurs so often in the literature. I have discussed this misunderstanding elsewhere.[1]

The sickle-cell trait is found in India and in Africa, but the common link is the finding of sickle cells in the Veddoids of South Arabia. Elsewhere [2] I have given the reasons for which this ancient stock seems to be the most likely source of the gene (apart from the possibility of its arising by independent mutation). Features common to Africa and to India may have come across the Indian Ocean in either direction, or may have filtered along the southern fringe of the Asiatic continent, entering or leaving Africa by land in the north-east; yet others, such as certain customs connected with cattle and milking cults common to the Todas of South India and to the Hottentots of South Africa, are likely to have their origin in Mesopotamia whence they made their way both to India and to Africa. It has been suggested that the Veddoids of Arabia are the remains of greater numbers whom the arrival of the desert climate drove forth to India; if there was such a centrifugal dispersal it might well have driven some to Africa, and there is even reason to believe [3] that they may also have spread into the Mediterranean region.

St. Bartholomew's Hospital, London, E.C.1.

H. LEHMANN.

1. *S. Afr. J. Sci.* 1954, **51**, 140.
2. *Eugen. Rev.* 1954, **46**, 101.
3. *Man*, 1953, no. 5.

ESTIMATION OF MERCURY IN ATMOSPHERE

SIR,—In the course of further work in our laboratories on methods of analysis for mercury in atmosphere and biological tissues, considerable variation in the results of recovery experiments was found when the method used in the investigation by Bidstrup, Bonnell, Harvey, and Locket [1] was checked.

A modification of the method for estimating mercury in atmosphere is described below, and it is recommended that the earlier method [2] be abandoned. The conditions necessary to avoid fluctuation in results must be so strictly controlled that this method in its original form is unreliable for routine use.

While the figures in the paper by Bidstrup et al. indicate that mercury was present in the atmosphere of the workshops, we consider that they do not give a reliable indication of the amount of mercury present. The accuracy of the method for estimation of mercury in urine is satisfactory.

D. HUNTER
P. LESLEY BIDSTRUP
D. G. HARVEY
J. A. BONNELL
R. DREW
E. KING.

Department for Research in Industrial Medicine (Medical Research Council), London Hospital.

Oldchurch Hospital, Romford, Essex.

S. LOCKET.

MODIFIED METHOD

Principle

A known volume of the atmosphere to be tested is drawn through a bubbler containing acid permanganate solution. This procedure extracts the mercury from the atmosphere and is the method of trapping described by Kuziatina.[3]

In the method described by Buckell [2] the permanganate solution is decolorised by adding oxalic-acid solution and warming. Investigation showed that this procedure for decolorising gave unreliable results. It is now recommended that the permanganate be cleared with hydrogen-peroxide solution and the use of this reagent is the chief innovation.

The mercury which has been trapped in the solution is determined by an extractive titration procedure which is a modification of the method by Buckell.[2]

Reagents

Trapping solution: potassium permanganate, 0·05 *N* in 5% sulphuric acid.

Decolorising reagent: 20-volume hydrogen-peroxide solution.

Dithizone (diphenylthiocarbazone) stock solution: 50 mg. % *w/v* in chloroform.

Dilute dithizone solution for use: dilute stock solution 1 in 100 with chloroform for immediate use, giving a 0·5 mg. % *w/v* solution.

Stock standard mercury solution: solid mercuric chloride 0·06767 g. is dissolved in glass distilled water and the solution made up to 100 ml. This gives a solution of concentration 500 μg. of Hg per ml.

Dilute standard mercury solution: the stock standard mercury solution is diluted 1 in 100 with glass distilled water to give a solution of concentration 5 μg. of Hg per ml.

All chemicals AnalaR grade.

Apparatus

Glass bead bubblers are used.

Method

The method is essentially an extractive titration. The bubbler is washed out with glass distilled water, the solution decolorised with 10 ml. of hydrogen-peroxide solution, and the sample transferred to a separating funnel.

Dithizone solution is added from a burette, in small amounts, and after each addition the two layers are mixed by shaking the funnel. The orange-red lower layer of mercury dithizonate is run off and titration continued until a final addition of dithizone, after shaking, remains blue-green.

A calibration graph is constructed with known amounts of mercury, plotting millilitres of dithizone solution against microgrammes of Hg. The volume of dithizone solution required to titrate an unknown sample can then be equated to its mercury content. On the above strengths, 1 millilitre of dilute dithizone solution is approximately equivalent to 2 μg. of mercury. Full details have been submitted for publication.[4]

1. Bidstrup, P. L., Bonnell, J. A., Harvey, D. G., Locket, S. *Lancet*, 1951, ii, 856.
2. Buckell, M. *Brit. J. industr. Med.* 1951, **8**, 181.
3. Kuziatina, N. S. *Zavodskaya Lab.* 1939, **8**, 174.
4. Drew, R. G., King, E. Unpublished results.

RUPTURE OF LAPAROTOMY WOUNDS

SIR,—It was disturbing to read Mr. Standeven's estimate (March 12) that wound dehiscence may take place after up to 7% of all abdominal operations. Mr. Standeven deserves credit for having placed the facts before us, though few modern surgeons would accept his figures. It is, however, surprising that this entirely preventable catastrophe should be regarded with the complacency formerly accorded to pulmonary embolus.

A "burst abdomen" is always due to failure of the suture technique before the tissues have healed sufficiently to withstand intra-abdominal tension. The time taken for tissues to heal is usually unknown, hence a suture should ideally last for at least a month. The weakest part of the abdominal wall is the midline, and the only layer worth considering for strength is the aponeurosis. It should surely not be beyond our resources to ensure that this is held firmly together for four weeks.

There are four common techniques involving either continuous or interrupted stitches and absorbable or permanent material. Interrupted sutures would at first seem stronger than a continuous stitch, but experience shows that where the tissues are poor there may be such necrosis within the constriction of each suture that the stitches cut out and allow the wound to open; with the continuous suture there is virtually no tissue deprived of its blood-supply by constriction all round. Against the continuous suture, on the other hand, is the fact that it must withstand a strain inversely proportional to the number of "bites" of tissue taken in closing a wound of standard length. This surely rules out catgut as a safe suture material, since its absorbability may vary between wider limits than those specified by the manufacturers.

The ideal material would appear to be a strong unreactive material that may be left permanently in the tissues, and I have personally had the greatest satisfaction from the use of monofilamentous nylon. I commenced using no. 5 (black), but I now use a continuous suture of no. 7 (purple); and I believe that with ordinary care I shall entirely abolish postoperative wound disruption. I have had one failure due to my own carelessness in tying a poor knot and trimming the ends too short, but this is unlikely to happen again. I must also report an incidence of 1% of sinus formation leading down to the knot at one or other end. I regard this as a small price to pay for the complete safety from wound disruption and herniation, but I am hopeful of finding a way of securing the ends of my continuous suture that will be free from the risk of this minor and uncommon complication.

Birmingham. WILFRID MILLS.

SIR,—Mr. Standeven's article is a valuable contribution to this important subject. I would like to emphasise the significance of his observation that bursting of the abdomen is always accompanied by an ooze of serous fluid which is often bloodstained.

In many cases the wound has broken down completely before the skin sutures are removed, protrusion of the viscera being prevented only by the skin sutures. The apparently sound apposition of the skin edges at the time of removal of the sutures may mask the serious underlying condition. Only too often in these cases there is sudden protrusion of intestine during the day after the skin sutures have been removed.

In general the occurrence and degree of visceral protrusion determine the mortality of this dangerous complication of abdominal surgery. All house-surgeons and nursing staff should be taught that a serous exudate, especially if bloodstained, from a clean stitched abdominal wound indicates rupture. When such an exudate is observed the skin sutures should be removed in the operating-theatre and the underlying defect immediately repaired.

Mr. Standeven cites an estimated incidence of incisional hernia of 4%.[1] With vertical incisions in the upper abdomen the incidence is probably very much greater. Cosbie Ross and Walsh,[2] in a follow-up of a series of cases of partial gastrectomy, found incisional hernia in 11 of 93 cases examined.

The incidence of burst abdomen and particularly of incisional hernia is far too high and is a reproach to surgery.

Dublin. ANTHONY WALSH.

1. Romanis, W. H. C., Mitchiner, P. H. Textbook of Surgery, London, 1937; vol. II, p. 602.
2. Ross, J. C., Walsh, A. *Postgrad. med. J.* 1949, **25**, 269.

A SHARED RESPONSIBILITY

SIR,—Your leader of last week is timely. It should be remembered that responsibility for patients already in our charge is in no way lessened by the necessity to admit others. Premature or precipitate discharge may result in medical or social crises, or both, which have unfortunate but justified repercussions on—or from—patients and their friends. In such cases the terms "uncoöperative" and "difficult" are often misapplied to the patient and his family; but in fact they describe only too aptly those of us who fail to plan in time for adequate social arrangements to be made.

As Miss Sheridan points out, when time and opportunity are given for constructive planning and adjustment, discharges can usually be arranged which are satisfactory and acceptable to all concerned. Indeed experience of this type of "shared responsibility" demonstrates that *earlier* discharges are in some cases possible.

The sharing of responsibility can only become an everyday practice where contact between medical staff, patients, their friends, and the social services is close throughout treatment.

West Middlesex Hospital, Isleworth. MARJORY W. WARREN.

YELLOW PHOSPHORUS POISONING

SIR,—Dr. Caley and Dr. Kellock, in their very interesting account of a case of yellow phosphorus poisoning (March 12), ignore two very important points of toxicology, the second of which probably explains the wide variation in clinical "lethal" doses.

These points are: (1) route of absorption (I take fairly large amounts of sodium fluoride daily, but take great care that none shall enter my respiratory system); (2) vehicle of administration (an attempt to poison Rasputin with cyanide failed on account of the sugar used to mask the dose—a very heavy one).

In the case described, a woman of 71, there would be very little ability to digest fats; ability to digest fats wanes with age, except in the Eskimo, who have evolved a race of fat digesters because fat was the only pure form of energy food available to them. The patient took the phosphorus on bread-and-butter, and would likely spread the butter thickly to mask the taste; the yellow phosphorus, being strongly fat-soluble, would mostly remain in the unabsorbed fat and do no harm. I have pointed out[1] that this also happens with the fat-soluble vitamins, and this is an important cause of the frequency and lethality of respiratory infections in the older population.

Now, though 500 mg. was ingested, how much was absorbed is quite another matter. As I have pointed out,[1] if I ingest an egg I may acquire 80 calories of energy or fewer calories than that, or may actually lose calories by combating putrefaction of the undigested egg or by the voiding it by vomiting.

My purpose is not in any way to disparage the account or the treatment given, which probably saved the patient's life, but to point out that lethal doses are described in individual cases which vary from 50 to 400 mg.; this means that survivors have ingested (but not absorbed) varying amounts between these extremes, and in the present case 500 mg. is said to have been ingested. There must, therefore, be some other factor than ingestion; and this factor, in some cases at least, will be the vehicle of administration—i.e., the fats in the food and in the intestine which elderly people in temperate and hot climates are progressively less able to split and absorb.

Bitton, near Bristol. A. T. TODD.

1. Todd, A. T. Good Living. Bristol, 1953.

RABIES IN GERMANY

SIR,—Your annotation of Jan. 1 mentions reasons why the vaccination campaigns applied successfully in four specified countries are not applicable to conditions in Western Germany. Since the Malayan campaign is one of those cited, and since it would appear that at least one reason adduced for non-employment of similar methods in Germany is false, you will, perhaps, permit me to comment.

It is doubtful whether full, critical, and unbiased consideration has been given to the rôle that mass vaccination of the dog population can play in a country faced with a serious rabies epizootic. Six reasons are given why vaccination of dogs in Germany has been rejected. They are:

1. *That wild animals are chiefly affected.*—This of itself is not an argument against the vaccination of dogs, or, for that matter, of cats or cattle, all of which can be successfully immunised.[1] There is no evidence that in Germany the infection in wild animals constitutes a serious threat to man: it is probable that infection in human beings would be more likely to result from the bites of dogs or cats than from those of foxes, badgers, deer, wild boars, cattle, or squirrels. If, then, the vaccination of dogs and cats can very largely prevent the transmission of the disease to man it is not immediately obvious why vaccination has been rejected as a control measure.

2. *That cats are considered more dangerous than dogs.*—The cat is not usually regarded as an important vector of the disease. Since, however, cats can be effectively immunised against rabies with chicken-embryo vaccine (Flury strain),[1] it is curious that their vaccination does not seem to have been considered.

3. *That police measures have been successful in the past in controlling infection in dogs.*—It is apparent from the references cited in your annotation [2 3] that police measures are no longer as reliable or as adequate in the particular circumstances of the moment as they are reported to have been in the past. I have had some experience of the seeming reluctance of certain Continental veterinary authorities to accept the vaccination of dogs as the powerful prophylactic weapon that it has proved to be.[4–7] Whilst the vaccination of dogs, even using the more modern vaccines, is not necessarily the main feature in any rabies control programme, there is increasing evidence that, when rigidly applied, it can succeed where conventional police sanitary measures have failed.[7–9] To reject the vaccination of dogs as a control measure in a country seriously infected with disease is hardly consistent with the resolution adopted in the 22nd session (1954) of the committee of the Office International des Epizooties,[10] on which the German authorities were represented. The resolution states that in a seriously infected country strict police sanitary measures should be applied together, where necessary, with the preventive vaccination of all dogs aged 3 or more months by means of an officially controlled vaccine of proved innocuity and antigenicity.

4. *That vaccinated dogs must still be controlled, because their saliva is infectious, even though they are protected against clinical development of the disease.*—This is a most remarkable statement and one, I suggest, that should be viewed with the greatest reserve. It implies that a carrier state in dogs is induced by vaccination and, apparently, on a general scale—a finding that is, in my view, quite new. Zunker[11] states:

"Il y a assez de rapports à notre disposition pour prouver que les chiens vaccinés peuvent contracter la rage malgré la vaccination avec du virus fixe et qu'ils peuvent propager la maladie. Ils ne l'ont pas fait parce qu'ils sont tombés malades au *stadium prodromorum* et non pas au *stadium irritationis* et ainsi la malade a été difficilement décelable. La salive de tels animaux a été examinée et trouvée infectieuse."

This is a somewhat different state of affairs from that quoted in your annotation. It is not unlikely—indeed, it is highly probable—that such animals were vaccinated when in the incubative stage of the disease: this is a not unusual finding in any vaccination campaign although it may be less likely to occur with chicken-embryo vaccine (Flury strain) than with a vaccine of the Semple type.[7] Zunker's statement cannot be accepted as a condemnation of vaccination: there is too much evidence to the contrary.

5. *That the public would be less likely to coöperate in other control measures if dogs were vaccinated.*—This must remain a matter of opinion. It was certainly not the case in the 1952–54 control campaign in Malaya. The purpose of mass vaccination was, prior to this campaign, explained through every possible publicity medium, and the reasons for its being made compulsory were made abundantly clear. Public coöperation was most gratifying. A total of over 115,000 dogs was vaccinated in the whole of the Federation of Malaya during 1954, representing not less than 85% of the total dog population. The last recorded case in a dog was in June, 1953—i.e., 20 months ago.

In any rabies control campaign it is essential that adequate legislation exists to counter every move of those who, for one reason or another, attempt to evade this measure designed to protect human beings from an exceedingly unpleasant death. Legislation, even though it may have to be draconian, must be backed by an official determination to enforce it. Half-measures are unlikely to succeed. It is, perhaps, significant that the successful vaccination campaigns in the four countries quoted in the annotation—Hungary, Israel, Japan, and Malaya—were all *compulsory* ones.

6. *That the cost and effort in vaccinating all dogs would be very great.*—If a charge is made for vaccination a rabies control campaign need cost the authorities very little. One of the most promising of the newer vaccines—the chicken-embryo vaccine (Flury strain)—is produced on a large scale only in America, and its purchase would, of course, involve dollars. An alternative would be to use a potency-tested nervous-tissue vaccine injected intramuscularly, as recommended by W.H.O.[1]

The effort required must be balanced against the benefits that may accrue. From the point of view of the protection of human beings there can only be one conclusion.

Office of the Director of Veterinary Services,
Federation of Malaya,
Kuala Lumpur. C. W. WELLS.

1. *Tech. Rep. Wld Hlth Org.* no. 82, 1954.
2. Zunker, M. *Bull. Off. int. Epiz.* 1954, **42**, 83.
3. Ruppert, F. *Ibid*, p. 70.
4. Meyer, K. F. *Bull. Wld Hlth Org.* 1954, **10**, 856.
5. Vittoz, R. *Bull. Off. int. Epiz.* 1950, **34**, 37.
6. Kaplan, M. M., Goor, Y., Tierkel, E. S. *Bull. Wld Hlth Org.* 1954, **10**, 743.
7. Wells, C. W. *Ibid*, p. 731.
8. Bruckner, A. L. *Proc. U.S. live Stk sanit. Ass.* 1946, **50**, 37.
9. Korns, R. F., Zeissig, A. *Amer. J. publ. Hlth*, 1948, **38**, 50.
10. *Bull. Off. int. Epiz.* 1954, **42**, 857.
11. Zunker, M. Office international des epizooties, report no. **354** to the 22nd Session, 1954.

EPIDEMIC VERTIGO

SIR,—The case-reports of epidemic vertigo uncomplicated by oculomotor palsy—e.g., Dr. Leishman's (Jan. 29) cases 3 and 5, and possibly 2 correspond, as regards history, signs, and progress, to the vestibular neuronitis described by Hallpike [12] and Dix and Hallpike.[13] If caloric tests of vestibular function are carried out on patients with vestibular neuronitis when the acute symptoms have subsided, it is found that function is absent or deficient on one or both sides. Since loss of vestibular function usually persists in spite of symptomatic recovery it is not too late to carry out caloric tests on Dr. Leishman's cases, and on those reported by subsequent correspondents.

It would be a pity if two terms, implying the existence of two separate clinical entities, were introduced for what may be one and the same condition. May we perhaps look forward to hearing from your contributors regarding the results of caloric vestibular-function tests in their cases?

Dulwich Hospital,
London, S.E.22. BERNARD FREEDMAN.

SIR,—It is doubtful if Dr. Leishman's "epidemic vertigo" with oculomotor complication constitutes a new entity, or his substitution of this term for "acute labyrinthitis" an advance of ætiological significance.

12. Hallpike, C. S. *Congr. int. Oto-rhino-laryng.* London, 1949; vol. 2, p. 514.
13. Dix, M. R., Hallpike, C. S. *Proc. R. Soc. Med.* 1952, **45**, 341.

The cases described by him appear to comprise two elements: (*a*) a Ménière component (sudden onset of vertigo accompanied by vomiting, with or without spontaneous nystagmus and tinnitus); and (*b*) the sphenoidal sinus syndrome (occipital or retro-orbital headache, vertigo, and tinnitus). The oculomotor involvement is the commonest of the ocular palsies in sphenoidal-sinus disease, where the sinus pneumatises the greater wing of the sphenoid. Since on Dr. Leishman's own cognisances the "epidemic" qualification is not really adequately supported, it is a pity that the otherwise full investigations were not accompanied by a nasopharyngoscopic one, and catheterisation and lavage of the sphenoidal sinuses with full examination of the "returns."

Cape Town, South Africa. M. GLASS.

OSTEO-ARTHRITIS OF LUSCHKA JOINTS

SIR,—Dr. E. J. Crisp's theory of the causation of root pain in the arm (Feb. 5) makes very interesting reading. Of more practical value in the treatment of this very common disabling condition would be an account of his technique of "neck traction," which in his experience almost always affords relief.

Idutywa, Transkei, South Africa. D. C. G. COOPER.

*** This letter has been shown to Dr. Crisp, who writes: "Neck traction is best given with the patient in the recumbent position and may be carried out manually or by weights and pulley using the Sayre's sling. The important point in technique is correct posturing of the neck, for if the cervical spine is extended most of the pull will be applied to the trachea and œsophagus. Hence, if we wish to stretch the capsular ligaments of the joints of Luschka, traction is given with the neck in a moderate degree of forward flexion, while if it appears that the symptoms arise in the zygapophyseal joints the neck is flexed still further forward. When posterior marginal lipping is severe enough to give rise to "electric-shock-like" feelings in the legs if the neck is suddenly bent forward, the object of treatment will be to increase the range of cervical extension so that the spinal cord will come to lie more posteriorly in the thecal canal. Traction is therefore given with the neck in the neutral or slightly extended position. In all these cases the poundage employed will vary from 25 lb. to 45 lb., for a duration of upwards of 15–20 minutes, treatment being given daily until relief is obtained."

INNOCUOUS TEMPORARY IMMOBILITY

SIR,—"Rhodesian Doctor" rightly draws attention in his letter last week to the questionable diagnosis of Miss Peace's attacks. Nurses, more than printers or those in other occupations, frequently describe conditions other than the immobility, which I have dealt with elsewhere.

The case of the sleep paralysis, described by "Rhodesian Doctor," accompanied by sleep hallucinosis of an auditory nature is of a type less common than that accompanied by visual hallucinations; but episodes of irresistible sleep without structural lesions are more likely to be due to "idiopathic" narcolepsy, especially as sleep hallucinosis is frequently associated with that condition.

Although without a detailed psychological analysis of each case no denial of conflict can be made, it would appear to be absent in instances in which fear is unlikely to have occurred, such as that of a man unable to move to prevent his supper from burning over the gas or of a look-out who saw a ship clearly but could not report it. In many cases among nurses, the subject has been unable to rise to meet a senior member of the staff so that the existence of unconscious fear cannot be excluded; but in one case a man could not move when his relief, junior to him, came.

"Rhodesian Doctor" is not quite right in reporting that I would prefer to call the condition "innocuous temporary immobility." In view of many conditions, such as standing to attention, being also states of innocuous temporary immobility the condition can be described as "an innocuous temporary immobility," but it is inaccurate to omit the indefinite article.

Bristol. G. DE M. RUDOLF.

JAUNDICE

SIR,—According to my reckoning, there are 35 causes of jaundice, and it is not surprising that the diagnosis is sometimes obscure.

In an effort to clear my own mind, I have tried—on paper—to evolve a diagnostic plan. However, pencil and paper are poor substitutes for experience, and as the acquisition of experience consumes both time and lives I should like to submit my premises and conclusions to the criticism of your readers.

Premises

1. Medicine can offer specific treatment in those types of jaundice which are due to a spirochæte or a rhesus anomaly. In all other cases it can offer supportive and symptomatic treatment.

2. Surgery can offer an almost certain cure in acholuric jaundice, a probable cure in calculous jaundice, the chance of a cure in postoperative or congenital stricture, and the hope of a cure in malignant obstruction.

3. Calculous jaundice is nearly always intermittent, hardly ever deep and progressive.

4. The administration of a general anæsthetic to a patient with infective hepatitis is a disaster, and operation on a jaundiced patient is fraught with the danger of postoperative anuria.

5. Radical pancreatico-duodenectomy is open to the following objections:

(*a*) Its mortality-rate is high, and many of the dead patients might have been given a valuable lease of life by a short-circuit.
(*b*) Its cure-rate in cancer of the head of the pancreas is very low.
(*c*) Operable carcinoma is not easily distinguished from chronic pancreatitis.

Conclusions

1. The normal approach to a therapeutic problem—that of basing treatment on an accurate diagnosis—has disadvantages in a jaundiced patient, because the difficulties of diagnosis tempt both physician and surgeon to use exploratory laparotomy as a diagnostic instrument. This hazard can be minimised if we reverse our normal processes of thought, and attempt to narrow the diagnostic field by a system of exclusion rather than by one of selection. In jaundice, more than in any other disease, one should ask oneself the question: Is this operation really necessary?

The following types of case should *not* be operated on:

(*a*) Children (acholuric jaundice and congenital stricture excepted).
(*b*) Young adults with deep and progressive jaundice.
(*c*) Mild or transient jaundice, unless associated with the clinical and radiographic features of gall-stones.
(*d*) Patients with evidence of related disease in other parts of the body (e.g., cancer of the stomach, bowel, or breast; enlargement of the spleen [except in acholuric jaundice]; ascites; œsophageal varices).
(*e*) The old and decrepit, the drowsy, the hiccupping, and those with oliguria or anuria—because operations on the dying serve no useful purpose.

2. If the original list of 35 starters is consulted, it now seems that very few runners are left. They are as follows:

(*a*) Suspected congenital or postoperative strictures, which will demand exploration.

(b) Suspected acholuric jaundice, which the laboratory will confirm.
(c) Transient or fluctuating jaundice, with the clinical and radiographic features of gall-stones.
(d) Deep and progressive jaundice in a middle-aged or elderly patient, fit to withstand a major operation. It is in this type of case that liver-function tests have their main, and possibly only, practical value. If they, and needle biopsy, do not distinguish between infective hepatitis and obstruction of the bile duct, we are left with:

3. The only finisher, a middle-aged or elderly patient, deeply jaundiced for a month, fit for major surgery, and with equivocal liver-function tests. One must now resort to the last court of appeal, exploratory laparotomy, and the following procedure is suggested:

Make a short Kocher incision under local anæsthesia. If the liver has the appearance of infective hepatitis (and I should be glad to know if a "typical" appearance exists) or contains deposits of cancer, close the abdomen. If the gall-bladder is distended or diseased, give a general anæsthetic, extend the incision, and perform a laparotomy. If the findings suggest a stone impacted in the ampulla, remove it; if they suggest carcinoma of the head of the pancreas, or chronic pancreatitis, perform a short-circuit; if they suggest carcinoma of the ampulla, carry out a radical pancreatico-duodenectomy. An alternative to the "short Kocher" is to buy a peritoneoscope.

South Mimms, Hertfordshire. V. J. DOWNIE.

ENURESIS

SIR,—Dr. Poulton, in your last issue, refers to the combination of physical causes which in his view give rise to enuresis, and then says that "waking, restriction of fluids, drugs, and the nocturnal bell-ringing device" "must be brought to bear" on them.

Even if all were agreed about the ætiology of enuresis, the effect of such treatment on the child needs further thought. The child is as unaware of having too small a bladder, and too much urine, as he is of emotional tension. He knows that he wets the bed and has mixed feelings about it—most of these reflecting the adult's attitude towards it. If he is unaware of the cause, punishment will seem to him unjust. If he feels guilty, punishment will increase his guilt. There is no evidence that children accept being wakened, having bells rung at night, and being deprived of fluids with any better grace than an adult would accept these things. On the contrary, such management must tend to emphasise their helplessness—a state of affairs which breeds resentment.

Whatever we believe the cause of enuresis to be, we agree that punishment in itself will not cure it. What punishment will do, however, is to concentrate the child's attention both on the deed and on the surrounding sentiment. Whether disapproval of this dis-ease is expressed by caning or being wakened several times every night, to the child the cruelty will appear the same.

It is not far fetched to believe that, having unconsciously done something of which the adult disapproves, the child in turn resents the adult's behaviour. Legitimate revolt not being part of his privileges, he is driven further along the road of suppressed anger. Whether his bladder capacity later improves or not, his earlier treatment will have left indelible marks on his character.

London, S.W.15. HEDY SYMONDS.

SIR,—In your leading article on enuresis (Feb. 19) you mention an electric alarm which wakens the enuretic patient as soon as micturition starts. In patients in whom night incontinence is due to imbalance between the sleep depth and bladder sensation, the alarm works by establishing a conditioned reflex over a period of days or weeks.

Various patterns have been described from time to time, but a compact apparatus is now available in this country. It consists of a small metal box containing a dry battery, an alarm "rattle," an indicator bulb, and a switch. Perforated aluminium-foil pads are used which are soft, malleable, and of the consistency of thin canvas. These are placed beneath the patient, separated by an ordinary draw-sheet, and covered by a similar sheet. The alarm operates with as little as 2 ml. of fluid.

This apparatus, the 'Chiron' nocturnal enuresis alarm, is marketed by Messrs. Down Bros. and Mayer & Phelps, 32, New Cavendish Street, London, W.1.

London, W.1. D. F. ELLISON NASH.

EFFECTIVE CIRCULATION OF UTERINE WALL IN LATE PREGNANCY

SIR,—The remarks by Mr. Morris and his colleagues (Feb. 12) on the cause of the sudden onset of pre-eclampsia interested me very much.

In recent years a lively discussion has arisen about hyperfunction of the adrenal cortex as a possible factor in the genesis of toxæmia of pregnancy.

Browne [1] in 1944 remarked that it had not been determined whether the adrenal cortex played any part. Novak [2] had stated: "the tendency towards salt and water retention is probably caused, partly by an increased function of the adrenal cortex, which is generally markedly enlarged in pregnancy, and partly by the amounts of estrogen and progesterone produced in the maternal organism."

I have put forward the following hypothesis [3]:

During pregnancy the adrenals are hyperfunctioning, to meet the needs of the fœtus. The permeability of the mother's capillaries is affected by the increase in cortical hormones; and the effect is to encourage retention of sodium and water. Adrenal cortical and medullary function are interrelated, as we know from Addison's disease; if no cortical hormones are produced, noradrenaline cannot be synthesised. In pregnancy the quantity of disposable cortical hormones is increased, and so too will be the quantity of noradrenaline. The greater part of these hormones are stored in the gland, to be later released by some "trigger mechanism" and cause œdema, and also hypertension as in phæochromocytoma. Phæochromocytoma has often been found in cases of toxæmia. One of the best provocative tests is intravenous injection of 0·005 mg. of histamine, after which the blood-pressure rises to 300 mm. Hg. Could the same thing occur spontaneously where there is no phæochromocytoma but only hyperfunction of the adrenals, in which the greater part of the gland's secretions have been stored?

Clearly, Nature does not like histamine, the end-product of allergic reaction, circulating freely in the maternal blood, for the histaminolytic power of the maternal serum steadily increases, and the same is true of that other product of antigen-antibody reaction—acetylcholine—for cholinesterase also increases during pregnancy, especially in cases of toxæmia.[4] Should some histamine escape destruction, then the cortical and medullary adrenal hormones are suddenly released, causing œdema and hypertension. By constriction of the arteries the placental circulation is diminished. The antigen giving rise to rhesus incompatibility passes through the placenta from the fœtus to the mother, and the antibodies back from the mother to the fœtus; probably maternal histaminase (produced in the maternal part of the placenta) also passes to the fœtus. Mostly the result of an antigen-antibody reaction—histamine—will be destroyed, but now and then it may escape, causing release of adrenal hormones, which in turn are responsible for œdema and vasoconstriction; infarcts of the placenta are formed under the influence of noradrenaline. If this working hypothesis is right, then Rh incompatibility should be commonly accompanied by toxæmia. This is in fact so, not only when Rh incompatibility manifests itself as hydrops fœtalis and placentæ, but also in icterus gravis and its sequel, anæmia neonatorum. When after birth histaminase is lacking, histamine escapes destruction and can cause release of adrenal hormones. It is probable that cortical mineralocorticoids control the passage of sodium through the wall of the erythrocytes and eventually hæmo-

1. Browne, F. J. *J. Obstet. Gynæc., Brit. Emp.* 1944, **51**, 438.
2. Novak, E. *Amer. J. Obstet. Gynec.* 1937, **34**, 237.
3. Schuurmans, E. *Med. Tijdschr. Geneesk.* 1950, **94**, 319; *Zbl. Gynäk.* 1953, **75**, 241.
4. Hofbauer, J. *West J. Surg.* 1941, **49**, 615.

lysis; the reduction of available histaminase at birth may explain the onset immediately afterwards of icterus gravis.

In the light of this working hypothesis I administer anti-histamine substances in toxæmia of pregnancy and Rh incompatibility.

Amsterdam. R. SCHUURMANS.

INACCURACY IN THE LABORATORY

SIR,—It is gratifying to note, from your annotation last week, that freeze-dried samples of blood-serum will soon be available for use as standards in hospital laboratories. But one wonders to what extent this will be effective in localising the sources of error in clinical biochemistry, and in remedying them.

The international survey to which you referred [1] was conducted with similar material, and this was available to all laboratories in this country. Yet only a few participated. Besides, detailed analysis of the problem [2] has shown the matter to be complicated by a number of factors, not the least being the degree of skill and the psychological condition of the analyst. Further work [3] has shown that the standardisation of proprietary brands of laboratory reagents may leave much to be desired; while some of the techniques employed do not stand up to critical scientific appraisal.

What does seem desirable is a thorough overhaul, possibly at the national level, to involve analytical methods, standardisation of reagents, laboratory equipment, and personnel. Would the clinical value of the laboratory results warrant such an effort? What is the position with regard to the other branches of clinical pathology?

Area Pathology Laboratory,
Westwood Hospital,
Beverley, Yorks. O. BASSIR.

MASKED EPILEPSY

SIR,—I am glad that Dr. Kempton (Jan. 22) commented on Dr. Wallis's paper on masked epilepsy (Jan. 8). It is, of course, well known that there are various unusual manifestations of epilepsy, such as sudden attacks of abdominal pain, sudden vomiting, and psychomotor equivalents. I agree with Dr. Kempton, however, that it is going altogether too far to suggest that epilepsy is an important cause of cyclical vomiting, headaches, night terrors, unexplained fever, personality disorders, pains in various parts of the body, and even the so-called three-month colic. I can see not the slightest connection or resemblance between, for instance, three-month colic and epilepsy.

I found Dr. Wallis's case-records unconvincing. The two cases of so-called cyclical vomiting were certainly not typical of that condition; and the association with unconsciousness suggests that the diagnosis was something else, perhaps epilepsy. Dr. Wallis does not mention the mode of onset in his case-histories. For instance, headache of gradual onset would not make one suspect epilepsy; headache or other pain of very sudden onset might.

It is well known that acute infection with fever may precipitate fits in an epileptic (apart from the so-called febrile convulsions), and that elevation of temperature may result from a severe major convulsion. That is another thing, however, from saying that attacks of fever may be manifestations of epilepsy.

I am similarly unconvinced by the finding of an "abnormal" electro-encephalogram. In the first place, very few of us clinicians are competent to interpret electro-encephalograms. We have to rely on someone who knows how to interpret them. "Abnormal" electro-encephalograms can be found in otherwise normal persons, such as relatives of epileptics, and in children with fever as a result of an acute infectious disease. The finding of an "abnormal" electro-encephalogram in patients with vomiting surely does not prove that the vomiting is due to epilepsy. After all, epilepsy is common. So are cyclical vomiting, headaches, three-month colic, abdominal pain, and personality disorders; and it would be surprising if some epileptics did not have some of these conditions.

It would be a tragedy if all children with cyclical vomiting and the other conditions mentioned were deemed to be epileptics. If general practitioners accepted Dr. Wallis's thesis, the hospitals would be inundated with requests to investigate these cases for epilepsy.

Department of Child Health,
University of Sheffield. R. S. ILLINGWORTH.

SIR,—Having read Dr. Wallis's article and his reply (Feb. 26) to Dr. Millichap's letter (Feb. 19), I want to add that we saw in our clinic about four months ago a patient with cyclical vomiting and a patient with periodic symptoms who had received several forms of treatment without benefit. We concluded that these might be instances of masked epilepsy; and we began treatment with phenobarbitone, which has proved successful. We hope soon to publish these cases along with the electro-encephalographic findings.

Gureba Hospital,
Istanbul, Turkey. O. N. ULUTIN.

TREATMENT OF CHRONIC AMŒBIC DYSENTERY

SIR,—In his article on the Treatment of Chronic Amœbic Dysentery with Antibiotics in Combination with other Drugs (March 12), Lieut.-Colonel Inder Singh says: "Usually gr. 4 of emetine will quickly control an acute attack of amœbic dysentery but the amœbic cysts are not affected." Again, later in the article, he states: "Since then aureomycin and oxytetracycline have been found to combat the secondary infection and to destroy both the trophozoites and the cysts."

One gets the impression that the destruction of cysts is an important aim in treatment. This misapprehension is prevalent even among physicians with a wide experience of tropical diseases. In reality it is pointless to consider treatment to destroy harmless cysts whose presence in the fæces is merely indicative of the existence of an infection of the bowel wall with amœbæ. Destroy the amœbæ and cyst production ceases. Despite assertions to the contrary it is by no means certain that any drug given by mouth destroys cysts within the lumen of the bowel; it is much more probable that such a drug would destroy trophozoites, thus preventing further formation of cysts with consequent disappearance of the latter from the fæces.

Calcutta. C. B. ANDRADE.

HOSRITAL REPORTS FOR INDUSTRIAL MEDICAL OFFICERS

SIR,—In common with many other industrial medical services it is the practice in this department to examine all employees who have had accidents or serious illnesses or operations, before they resume duty. Most of them have attended hospital either as an outpatient or inpatient.

Obviously it is vitally important for us to have a clear history of what has happened, what diagnosis has been made, and what treatment given before we can assist in the patient's full rehabilitation by giving him a suitable job. The patient is seldom able to supply this information, and never with accuracy. Therefore we obtain his consent and write for details to his general practitioner, who almost without exception is extremely courteous and coöperative. Although this help is willingly given, it must be an infernal nuisance for the doctor (possibly at the end of a long day) to dig out hospital reports, and often write further details and send them to us.

1. Proceedings of the 1st European Congress on Clinical Chemistry, Amsterdam, 1954.
2. Bassir, O. *Ass. clin. Biochem. Newsletter*, 1954, **2**, 10.
3. Bassir, O. Unpublished.

I suggest therefore that hospital consultants and their assistants could help considerably by asking their patients: What is your occupation? Has your firm an industrial medical service? Will you agree to a report on your condition being given to your company's doctor? If this is done a copy of the report issued to the general practitioner could be sent to the industrial medical officer, and it would save a great deal of work and speed up full rehabilitation.

It should of course be indicated on the general practitioner's report that a copy has been sent. So many of our good friends now automatically send us a copy of reports when they sign their patients off, and one wants to save them unnecessary work.

Medical Department,
British Railways, Southern Region,
London, S.E.1. L. J. HAYDON.

HOSPITAL STAFFS

SIR,—For several years your correspondence columns have carried *cris de cœur* from senior registrars about the shortage of consultant posts. Many suggestions have been made, including increasing the number of such posts and decreasing the number of senior registrarships. Although both these measures would go some way towards improving the position, the remedy would at best be only temporary and at worst might increase the present difficulties within a few years, as well as being extravagant in public money. There is a different aspect of this question which is not often enough considered.

When the generation of consultants now retiring made their choice of specialisation as against general practice, most of them knew that their career would be lengthy and at first economically crippling. They needed either considerable faith or large private means. Many of them sacrificed in the first ten years after qualifying the opportunity for marriage and having a family. If they failed to make the grade their outlook was much as it is today. But their numbers were restricted without the necessity for artificial control, since only determined and confident men were prepared to face the risk.

Since the war, and particularly since the start of the National Health Service, the whole emphasis of medicine has shifted to the hospitals. The first ten years of a specialist's career have been made feather-bedded and easily accessible to many who would formerly have been put off by the financial hardships. Every increase in the salary of junior hospital staff exaggerates this tendency, and will ultimately increase the number of senior registrars competing for consultant posts.

This is not to say that the tendency I am criticising has been entirely bad. Junior hospital staff can lead fuller, easier, and perhaps eugenically better lives. The discrimination in favour of those with private means has been eliminated. Unfortunately the sacrifices and struggles of the early years have not been eliminated also: they have been deferred until later on in life. This cannot be a healthy tendency. A man approaching middle age should be able to look forward to reasonable financial security. The right time for struggling is when you are young.

I feel very strongly that when the next pay increases are made (politicians nowadays refer to "change in the rate of rise of the cost of living" as if it were an inevitable process) they should be made in such a way as to help the young entrant into general practice. The lure of the hospital and consultant ladder is quite great enough already. It is at present often more profitable for the man qualified, say, for three years to go into hospital rather than into general practice. The work is easier, and the hours and conditions better. It is silly to say that one job is more worth while than another. Both are necessary—though the country could spare registrars more easily than general practitioners. The decline in the status of general practice is an artificial one, capable of correction.

The view that junior hospital staffs are perhaps overpaid is not one that is often expressed in your columns. For obvious reasons it is not likely to be a popular one. None the less I feel that it needs stating. It sounds priggish from the mouth of a registrar and complacent from the mouth of a consultant, and equally unconvincing from either. I write therefore as one who has benefited from and appreciated junior-hospital-staff pay, who is not at present contemplating entry to general practice, who is in a good position for unprejudiced thinking—and who dislikes unsigned letters.

London, S.W.1. C. J. DICKINSON.

SIR,—I am amazed by the solution to the senior-registrar problem suggested by Mr. McCarthy last week.

The "really worthy senior registrar" would have an additional letter (E) to his title, and an extra £200 a year. He would, of course, continue indefinitely to do work virtually equivalent to a consultant's, as at present, with never any hope of assuming full clinical responsibility.

In Mr. McCarthy's scheme the newly graded men are to be at the disposal of the hospital boards for "duties throughout the region." I take this to mean that they will be directed from peripheral hospital to peripheral hospital in the region concerned, as and when difficulties of staffing in the junior grades arise. They might even occasionally be working near their home and have a chance to see their family; for, as Mr. McCarthy himself points out, these men do have families.

Should some such solution be accepted, the problem would be considered solved once and for all.

The present acute concern about "the plight of senior registrars," arises presumably from the increasing difficulty of junior-grade staffing of peripheral hospitals. I submit that the real cause of this difficulty is the awareness among the younger men of the hopeless struggle of non-teaching-hospital senior registrars in recent years to obtain a permanent post in their own specialty.

If the reason for the shortage of consultant posts is, as we are sometimes given to understand, a financial one, then I would offer the following simple suggestions:

(1) Give the senior registrars who have completed their training, and who receive adequate recommendation from their chiefs, a small number of consultant sessions in a hospital group. Even three or four sessions would do provided (2) below is also granted.

(2) Allow them to make up for the other sessions with whatever private practice they can obtain in competition with other consultants.

SENIOR REGISTRAR.

DIAGNOSIS OF ACTIVE CARDITIS

SIR,—In the course of investigations on rheumatic carditis, one of us (G. C.) noted that the electrocardiogram (E.C.G.) of a patient with rheumatic fever showed a peculiar change following the administration of digitalis: after no more than an average therapeutic dose, the P–R interval increased to an extent normally observed only after toxic doses, and even then but rarely. This observation suggested to us that the peculiar sensitivity to digitalis of patients suffering from carditis (already alluded to by some authors) might prove of diagnostic value.

We therefore gave 0·8 mg. 'Cedilanid' (lanatoside C) intravenously to 34 patients with rheumatic carditis, and to a control group of 82 people with neurocirculatory asthenia.

The results supported our hypothesis: a significant delay in the P–R interval was observed in 10 out of the 34 patients with rheumatic carditis. The E.C.G.s began to show changes $^1/_2$–1 hour after the injection. These reached a maximum often as late as 24 hours after the injections and the changes lasted for 1–2 days. The delay in conduction was 0·16 sec. in 2 cases, and 0·10 sec. in 2 other cases, and it exceeded 0·03 sec. in every case. On the other hand, this effect was observed in none of the 82 people in the control group. This alteration in the E.C.G. may therefore be a sign of active carditis; and this is supported by the fact that the changes were observed only during the active

phase of the disease. Tests carried out after recovery were negative in every case, the P–R interval remaining unaltered.

As far as we are aware, this test has not previously been used in the diagnosis of rheumatic carditis without articular manifestations.

II Medical Clinic, University of Szeged, Hungary. G. CZONICZER R. SZABÓ.

HYPOTHERMIA IN THE NEWBORN

SIR,—I was fortunate in hearing Dr. Trevor Mann speak on this subject at the Royal Society of Medicine and was very much interested in his letter last week.

Three factors may contribute to the syndrome in varying degrees—namely, cold surroundings, immaturity, and infection. Where the weather is sufficiently severe the second and possibly the third may be absent.

The condition is almost wholly preventable and its appearance is surely a reproach to us all. Earlier generations took their babies to bed with them in cold weather, when the babies ran the risk of being overlaid. Doctors, midwives, and health visitors have preached the dangers of this practice, and of hot-water-bottle burns, without emphasising the need for *constant warmth*. Consequently we now see infants who have become cold in icy bedrooms and, when their condition deteriorates, are insulated in layers of blanket before being brought into the warm living-room.

Since a discussion last year with Dr. Mary Fisher, of the Oxford health department, I have seen no case from the city during the present winter. She has made sure that every midwife and health visitor in Oxford instructs the mothers under her care. Our scheme whereby a health visitor comes into the maternity wards each week provides another opportunity to reinforce this teaching and inquire about the coal position at home.

Treatment of the established syndrome is still a matter for discussion, and it is difficult for any one individual to see a sufficient number of comparable cases to speak dogmatically. Discussions with those who are dealing with experimental hypothermia in animals have revealed a number of fresh problems. Nor must we forget that, in neonates, new methods of treatment may produce unexpected long-term changes—e.g., oxygen therapy in premature infants. Do we yet know whether the premature baby's cerebral cortex is unaffected by prolonged cold?

Finally, is this a new syndrome? I suspect that Sparta had a name for it.

Radcliffe Infirmary, Oxford. VICTORIA SMALLPEICE.

SIR,—Dr. Trevor Mann asks if others have seen any examples of hypothermia in the newborn.

Those who see infants born outside hospital must surely be familiar with the clinical picture he describes, and I, for one, have carried a low-reading thermometer for some years, as these cases do not seem to be rare in the cold months of the year.

My experience has in most respects been similar to his, in that babies over $5\frac{1}{2}$ lb. weight at birth are often affected, and the appearance of the children is as he describes; but most of the cases in this district have had some degree of sclerema as well as œdema. This sclerema may be slight, only a few small areas, usually on the legs or buttocks, being affected; but this change has also been extensive.

During the recent cold spell 4 examples have been seen; and the largest number seen at one time was 5 in a fortnight, towards the end of the hard weather in 1947. The story has usually been the same—namely, that the family has run out of coal. This happened in the case of a small private maternity home some years ago. 2 infants, a few days old, were being nursed in a small unheated room. Both had pronounced hypothermia, œdema, and sclerema; and they recovered.

A clinical impression, notoriously to be mistrusted, has been that these infants, all œdematous, who had red cheeks and often red extremities, also had some infection. In each of the 2 cases for which necropsy records are available hæmorrhagic pneumonia was found. The prognosis has been far from hopeless, since more than half the infants have survived, and by no means all have been admitted to hospital. Dr. Mann is no doubt right in advising against too rapid heating of these infants. In 2 cases I probably made this mistake: 1 died after four days following rapid warming; and in the other, the worst yet encountered (the infant was so stiff with sclerema that the body could be raised like a board, by one finger placed underneath the back), rapid heating led to temporary improvement followed by death after sixteen hours, and hæmorrhagic pneumonia was found post mortem.

Recently cases of sclerema, some apparently examples of the syndrome under discussion, have been reported from America. In these recovery has apparently been facilitated by the use of corticotrophin. The condition in that country is thought to be very rare, and one wonders whether the much greater use of central heating and the larger number of deliveries in hospital may be the cause of this. In 3 of my own patients corticotrophin has been used, with recovery in 2 and death in the 3rd, described above.

With children who have such a low vitality, infection must always be imminent and admission to a hospital ward may be dangerous unless every precaution against cross-infection is taken.

Henoch in *Lectures on Children's Diseases, 1889*, translated by John Thomson and published by the New Sydenham Society, devoted a chapter to sclerema, originally described by Underwood in the 18th century, and differentiated this condition from "œdema of the newborn." This latter condition corresponds closely to the syndrome of hypothermia of the newborn. He emphasised the low body-temperature, noted the complications of pneumonia and convulsions, and described a case complicated by nephritis. He recognised that both sclerema and œdema could co-exist in the same patient.

A useful service has been done by Dr. Mann in drawing attention to this condition, but I do not believe that it is a new syndrome.

Wolverhampton. H. EVERLEY JONES.

Parliament

Obscene Publications Bill

IN the House of Commons on March 15, Mr. ROY JENKINS moved that leave be given to bring in a Bill to amend and consolidate the law relating to obscene publications. The measure, he said, had been drafted by the committee set up under the auspices of the Society of Authors, of which Sir Alan Herbert, and later Sir Gerald Barry, was chairman. The motion was agreed to, and the Bill was given a formal first reading.

QUESTION TIME

Heat Treatment of Milk

Replying to a question, Mr. HEATHCOAT AMORY, the Minister of Food, said that in the year ended September, 1954, about 87% of the milk supplied by retail in Great Britain was subject to heat treatment, compared with about 69% in 1945–46.

Leprosy in England and Wales

Replying to a question, Mr. MACLEOD said that in England and Wales there were 164 notified leprosy patients and two special hospitals for them, one near Redhill, Surrey, the other near Chelmsford, Essex.

Medicine and the Law

An Overlooked Swab

IN the Queen's Bench division on March 15 judgment was given in favour of a plaintiff who claimed that a swab had been negligently left in her abdominal cavity at a surgical operation.

On Jan. 7, 1953, the plaintiff was successfully delivered of a child by cæsarean section at a private nursing-home. From the evidence it appeared that the surgeon, before sewing up the peritonium, had removed those packs which he could see and for the rest relied on the formal count of used and unused packs made aloud by the theatre-sister. In fact one of the packs, 10 inches square, was left in the plaintiff's body. The plaintiff sued the surgeon, the assistant surgeon, and the proprietors of the nursing-home for damages for negligence. At the conclusion of the evidence the judge ruled that there was no evidence of negligence against the assistant surgeon, and he was released from the case.

Mr. Justice Pearson said that on the balance of probabilities there had been an error in the counting; on that finding there was negligence on the part of the theatre-sister, and that negligence was a cause of the pack remaining in the plaintiff's body. Therefore the nursing-home was liable.

As to the surgeon's liability, it had been submitted that it would have been sufficient for him to show that he had acted in accordance with a recognised school of opinion in his profession, and that, although he had a duty to take reasonable precautions to ensure that no pack was left in the plaintiff's body, he had fully performed his duty by relying solely and exclusively on the sister's count of the packs. His Lordship found that it was not proved that that was in accordance with any approved practice. If Spencer Wells forceps or some other precaution were not used, the surgeon, when removing the packs, should make some mental effort to remember where he had put them. Even if that finding were wrong, in the circumstances of the present case, he would hold that it was a negligent practice in an operation of routine nature, although there might well be emergency operations where different considerations would apply. The sister's count was fallible and needed some other precautions, and the fact that the other precaution was also fallible was not sufficient reason for not adopting it. Two good, though fallible, precautions, if both were applied, would achieve a high degree of safety. The sister's count was a secondary thing, a check on something the surgeon had already done. There was therefore negligence on the part of the surgeon also. Both the theatre-sister and the surgeon had failed in their respective duties. If either duty had been performed the mishap would have been prevented. The responsibility should be divided equally between them.

Judgment was given for the plaintiff for £3000, and judgment for the plaintiff's husband for £1146 special damages.

A Death from Tetanus

A boy of 15 fell off his bicycle and lacerated his elbow. He was taken to hospital, where a doctor stitched the wound, prescribed systemic penicillin, and ordered an injection of anti-tetanus serum. This order was subsequently cancelled when the boy told a nurse that he had six months earlier received an injection against tetanus from his own doctor. The boy was admitted to hospital six days later with symptoms of tetanus; on the eighth day, despite intensive treatment, he died.

At the inquest it transpired that the earlier injection had in fact been penicillin, not anti-tetanus serum. Replying to the coroner, the hospital doctor agreed that the ideal solution would be to verify patients' statements by making inquiries from their own doctors; in practice, however, this would tend to delay the patient's treatment. He had withheld anti-tetanus serum because, had the boy's statement been correct, there would have been a risk of causing a severe reaction.

The coroner drew the jury's attention to the fact that patients who are given an injection seldom know what is being injected. He suggested that hospitals should, except in cases of life and death, always take steps to verify patients' statements. The jury, returning a verdict of accidental death, added a rider to this effect.[1]

Obituary

MAX NEUBURGER

M.D. Vienna

THE history of medicine, as a continuous, detailed, and documented narrative, has for a century and a half been almost a prerogative of Germanic writers. This German period began with the magnificent work of Kurt Polykarp Sprengel, completed in 1803, and ends with the recent death in Vienna of Max Neuburger.

Neuburger had all the requisites of a great historian of medicine. He was well trained, had good experience in clinical medicine and scientific research, had great facility in acquiring languages, and enormous industry, and understood well the method and importance of documentation. Eminent though the German school of medical history has been, it cannot be said that many of its members possessed literary skill or charm. Here Neuburger stood out from the beginning. He wrote simply, clearly, and well, so that all his works are most readable. His two largest productions are of the highest importance. First was the great three-volume *Handbuch der Geschichte der Medizin*, which he edited in conjunction with his gifted and genial colleague Julius Pagel of Berlin. It was completed in 1905 and must long remain as the most comprehensive work of its kind. Second was his two-volume *History of Medicine*, of which the last part was published in 1915. Most of it was later translated into English. He was the author of a multitude of other learned, delightful, and useful communications, the value of which was acknowledged by the volume of essays presented to him by his admirers in 1948 on his 80th birthday.

Neuburger, who had years before established a school and institute of the history of medicine in Vienna, was appointed full professor in 1917, and taught there actively till he was 70 in 1938. In that year, with the Nazi outbreak in Austria, he had to leave and came to England. The Wellcome Historical Medical Museum gladly found a place for him and he continued, almost without interruption, in his output of works of learning. He refused to leave London during the war and, when he was long past 70, he underwent a grave operation during the blitz and recovered well from it. In 1948, at 80, he went to live with one of his sons in the United States. Important publications continued to come from him, but, in 1952, at 84, he determined to return to Vienna. Until his death he remained, by general consent of all who have any knowledge of the subject, the most important historian of medicine in the world.

C.S.

CHARLES RUSS

M.B. Lond.

Dr. Russ, who died on Feb. 26 at the age of 78, received his medical education at St. Mary's Hospital. In the preclinical years he showed particular ability in physiology, and after qualifying in 1903 he made a special study of the response of bacteria to electrical currents. His observation that, in a suitable suspension, there was a selective migration to one electrode was published in the *Proceedings of the Royal Society*. He went on to apply the working principle of migration to clinical conditions in gonorrhœa by a technique described in a book published in 1916. The method was also used with some success in the treatment of indolent varicose ulcers. He was given facilities for this work at St. Peter's Hospital, and later on he developed the results of his researches in private practice.

1. *Shrewsbury Chronicle*, March 4, 1955.

Notes and News

PRESCRIPTION OF TETRACYCLINE

THE Ministry of Health, Department of Health for Scotland, and Ministry of Health and Local Government, Northern Ireland, have arranged for tetracycline to be available on prescription from April 4. The Medical Research Council has informed the health departments that tetracycline is suitable for treatment of the same conditions as aureomycin and oxytetracycline (terramycin) [1]; and its toxicity is also similar, so the same precautions should be observed in its administration.

ONCHOCERCIASIS

EPIDEMIOLOGICAL surveys in Africa and in the Americas have shown that in some regions of both continents 80–100% of the population are infected with onchocerca. Because of ocular complications, onchocerciasis is of considerable social and economic significance. The first report of the Expert Committee on Onchocerciasis [2] is likely to prove a landmark in the evolution of our knowledge of this disease. Workers have been investigating it for twenty-five years; and this report shows how much and how little we know and wisely guides the thoughts of those working in this field to the work that should have priority. Some parts of the report are already outdated. The meeting was held in 1953, and since then—in 1954—another meeting has been held at Léopoldville. In the intervening period quite a lot has been uncovered; and many of the errors at the first meeting were corrected at the second. Probably the most valuable sections of this first report are those on control of the vector and of the parasite. The recommendations here are admirably expressed, and solid with conviction and sense. The two annexes—the first, by H. T. Dalmat, describing the method for testing susceptibility and resistance of larvæ of simuliids to insecticides, and the second, by J. P. McMahon, on methods of estimation of river discharge for control of simuliids by D.D.T.—are excellent. They will remain as standard works for a long time.

NUTRITION RESEARCH AT COONOOR

THE report for 1953–54 of the Nutrition Research Laboratories at Coonoor, South India, is a record of varied activities by the twenty-three graduate members of the staff. Part of the work, especially that on food analyses and field surveys, is essentially of local interest. But fundamental research is being carried out over a wide range of subjects. The body composition of a small group of healthy Indian men has been determined in respect of water content, cell-solids, and fat. Resting oxygen consumption was found to correlate more closely with the estimate of cell-solids than with surface-area as conventionally measured. Cell-solids or the "lean body mass" would appear to be a more valuable unit for expressing standards of basal metabolic rates than any other at present in use.

The rates of urinary nitrogen excretion by a group of men after a simple meal of about 1200 Calories and 25 g. of protein were higher if the protein was of animal origin than if it was of vegetable origin. With animal proteins nearly 50% of the excess nitrogen was excreted in the first three hours; the delay with plant proteins could be interpreted as showing a lag in their absorption and hence their subsequent utilisation.

In a study of the liver in rats on diets deficient in protein, calories, pyridoxine, and choline, either separately or in various combinations, the findings are being correlated with the histological picture of the liver in children in South India with nutritional œdema (kwashiorkor). Comparison of the liver pictures in nutritional œdema and experimental protein deficiency revealed many similarities, although they were not identical.

Further field studies have shown that vitamin B_{12} exerted no growth-promoting effect on South Indian children living in a residential institution either before or after improvement in the diet.

This report shows that Coonoor retains its place as a leading nutrition research laboratory. The staff are clearly not short of ideas, and have the ability to follow them up.

1. See *Lancet*, 1954, ii, 820.
2. First Report of the Expert Committee on Onchocerciasis. *Tech. Rep. Wld Hlth Org.* 1954, no. 87. H.M. Stationery Office. Pp. 37. 1s. 9d.

University of London

The degree of PH.D. in the faculty of medicine has been awarded to H. H. Khalil and A. H. Kitchin.

Mr. H. F. Cook, PH.D., senior lecturer at the Middlesex Hospital Medical School, has been appointed to the university readership in physics at the school.

University of Sheffield

Dr. Q. H. Gibson has been appointed to the chair of biochemistry.

Dr. Gibson was educated at Repton School and Queen's University, Belfast. He graduated M.B. with honours in 1941 and has since taken the degrees of M.D., PH.D., and D.SC. from Belfast. From 1941 to 1947 he was demonstrator and later lecturer in physiology at Queen's University, Belfast. He came to Sheffield in 1947 as lecturer in physiology and has since been appointed senior lecturer and recently reader in physiology. Last year he joined the editorial board of the *Biochemical Journal*. His published work has dealt chiefly with problems of hæmoglobin.

Dr. W. Whitaker has been appointed senior lecturer in medicine, and Mr. D. H. Randall and Mr. D. J. Robertson part-time clinical teachers in surgery.

West London Medico-Chirurgical Society

Sir Russell Brock has been awarded this society's triennial gold medal.

Institute of Dermatology

Chesterfield Medal.—Essays submitted for this award should reach the secretary of the institute, Lisle Street, London, W.C.2, by Sept. 30.

Association of Psychiatric Social Workers

This association is to hold its annual general meeting at the Middlesex Hospital, London, W.1, on Saturday, April 2, at 2.30 P.M. Dr. John Bowlby and Prof. R. M. Titmuss will open a discussion on Prevention in the Mental Health Field.

College of General Practitioners

Butterworth Gold Medal.—This medal is to be presented annually to the college by Messrs. Butterworth & Company, medical publishers, for an essay, not exceeding 10,000 words, written by a member or associate of the college, on a subject connected with general practice. As the subject for 1955 the council has chosen the influence of home conditions during the first five years of life on the physical and mental health of children. Essays must be submitted to the chairman of the awards committee of the college, 14, Black Friars Lane, London, E.C.4, by Sept. 30.

Devon and Exeter Medico-Chirurgical Society

On Thursday, March 31, at 4.30 P.M., Mr. J. W. Cook, F.R.S., principal of the University College of the South West, will open an exhibition of medical art and history in Exeter which this society is holding at the Royal Albert Memorial Museum, Queen Street, Exeter, during April (open 1.30–5.30 P.M. daily). The exhibition has been arranged by Mr. Norman Capener and will include some classics of medical literature from the library of the Cathedral Church of St. Peter and the Exeter Medical Library, documents relating to old Exeter hospitals from the archives of the city, and portraits and documents from the early years of the Royal Devon and Exeter Hospital.

Royal Society

The 25 newly elected fellows of this society include: Dr. A. W. Downie, professor of bacteriology in the University of Liverpool; Dr. K. J. Franklin, professor of physiology in the University of London at St. Bartholomew's Hospital Medical College; Sir Harold Himsworth, secretary to the Medical Research Council; Mr. A. F. Huxley, assistant director of research in physiology, University of Cambridge; Mr. O. E. Lowenstein, D.SC., Mason professor of zoology and comparative physiology, University of Birmingham; Mr. A. G. Ogston, D.PHIL., lecturer in biochemistry, University of Oxford; Mr. Guido Pontecorvo, PH.D., reader in genetics, University of Glasgow; Mr. J. A. Ramsay, PH.D., lecturer in zoology, University of Cambridge; and Mr. G. P. Wells, SC.D., professor of zoology in the University of London at University College.

On Thursday, June 16, Prof. C. H. Best, F.R.S., of the University of Toronto, is to give the Croonian lecture to this society, at Burlington House, London, W.1. He will speak on dietary factors in the protection of the liver, kidneys, heart, and other organs in experimental animals—the lipotropic agents.

Long-term Effects of Nuclear Explosions

Science for Peace is holding a public conference on this subject at Holborn Assembly Hall, John's Mews, London, W.C.1, on Saturday, March 26, at 2 P.M.

Edinburgh Medical Exhibition

Prof. D. M. Dunlop will open this exhibition at the Assembly Rooms, George Street, Edinburgh, on Monday, April 25, at 11.30 A.M. The exhibition will remain open till April 29.

Royal Army Medical Corps Funds

The annual general meeting of the members of the Funds will be held at 11, Chandos Street, London, W.1, on Monday, April 4, at 5 P.M.

Institut Français du Royaume-Uni

On Thursday, March 31, at 8 P.M., at the institute, Queensberry Place, London, S.W.7, Dr. B. L. Halpern will speak on Le Problème de l'Allergie.

World Health Day

On World Health Day, which is being celebrated in this country on April 5, Mr. Iain Macleod, the Minister of Health, will open a public meeting at 5 P.M. at the London School of Hygiene and Tropical Medicine, Keppel Street, W.C.1. Prof. G. Macdonald and Prof. J. M. Mackintosh will also speak.

Whittington Clinico-Pathological Society

The first meeting of this society will be held on Friday, April 1, at 5.15 P.M., at the Archway wing of the Whittington Hospital, London, N.19. Further particulars may be had from Dr. Arnold Bloom, the hon. secretary, St. Mary's Wing, Highgate Hill, N.19.

European Society of Cardiovascular Surgery

The fourth congress of this society will be held in Copenhagen from July 28 to 29, during the week of the International Society of Surgery. The subject chosen for discussion on July 28 is Surgical Treatment of Chronic Pericarditis, and on July 29 a symposium on Angiology will be held with the International Society of Surgery. The subjects of communications and discussions must be sent before April 15 to the secretary-general, Dr. G. Arnulf, 41, rue Sainte-Hélène, Lyons, France. The local secretary is Dr. A. Gammeltoft, Københavns Amts Sygehus, Copenhagen.

Industrial Health Advisory Committee

The first meeting of this committee was held on March 18. The committee is to advise the Minister of Labour and National Service on measures to further development of industrial health in work-places covered by the Factories Acts. The members include: Prof. R. E. Lane (Royal College of Physicians), Dr. J. A. L. Vaughan Jones and Dr. L. G. Norman (British Medical Association), Dr. R. S. F. Schilling (Association of Industrial Medical Officers), Dr. R. Nightingale (Association of Certifying Factory Surgeons), Dr. T. Bedford (British Occupational Hygiene Society), and Dr. R. S. Aitken (Committee of Vice-Chancellors and Principals of the Universities of the United Kingdom).

CORRIGENDUM: *Association of Surgeons of Great Britain and Ireland*.—The annual meeting in Glasgow in April will be held under the presidency of Prof. C. F. W. Illingworth, and not, as we announced last week (p. 628), of Sir Clement Price Thomas, who will be nominated as president at the meeting.

The Juan Perón prize (about £25,000) has been awarded to Prof. René Leriche.

Sir Ernest Gowers, chairman of the National Hospitals for Nervous Diseases, has been elected president of the Multiple Sclerosis Society.

Births, Marriages, and Deaths

BIRTHS

CARSTAIRS.—On March 5, to Jean (née Dutton), wife of Captain J. R. L. Carstairs, R.A.M.C., B.M.H., Up Park Camp, Kingston, Jamaica—a son (Andrew James).

Diary of the Week

MARCH 27 TO APRIL 2

Monday, 28th

MEDICAL SOCIETY OF LONDON, 11, Chandos Street, W.1
8.30 P.M. Dr. J. T. Ingram, Dr. C. Allan Birch: Cutaneous Manifestations of General Disease.

MANCHESTER MEDICAL SOCIETY
9 P.M. (Medical School) *General Practice*. Dr. Sylvia Guthrie: Gastro-enteritis in Infants.

Tuesday, 29th

INSTITUTE OF DERMATOLOGY, St. John's Hospital, Lisle Street, W.C.2
5.30 P.M. Dr. P. M. F. Bishop: Steroid Therapy.

MANCHESTER MEDICAL SOCIETY
8 P.M. *Surgery*. Prof. Oscar Scaglietti (Florence): Congenital Disiocation of the Hip.

Wednesday, 30th

ROYAL COLLEGE OF SURGEONS OF ENGLAND, Lincoln's Inn Fields, W.C.2
3.45 P.M. Dr. J. Stretton Young: Degeneration in Tumour Pathology. (Erasmus Wilson demonstration.)

UNIVERSITY OF LONDON
5 P.M. (St. Thomas's Hospital Medical School, S.E.1.) Prof. Mark Nickerson, SC.M. (Winnipeg): Specific Inhibitions of Adrenergic Responses.

ROYAL SOCIETY OF MEDICINE, 1, Wimpole Street, W.1.
8 P.M. *Paediatrics*. Dr. Hugh Jolly, Mr. G. H. Macnab, Prof. Dorothy Russell: Hydrocephalus of Infancy.

ROYAL INSTITUTE OF PUBLIC HEALTH AND HYGIENE, 28, Portland Place, W.1
3.30 P.M. Mr. Joseph Minton: Prevention of Blindness in Infancy and Childhood.

MANCHESTER MEDICAL SOCIETY
4.30 P.M. Dr. Robert Forbes: Recent Developments in Medical Litigation.

Thursday, 31st

ROYAL COLLEGE OF SURGEONS OF ENGLAND
5.30 P.M. Prof. Lambert Rogers: Vascular Diseases in Relation to Otolaryngology.

ROYAL ARMY MEDICAL COLLEGE, Millbank, S.W.1
5 P.M. Dr. Bernard Schlesinger: Indications for Cortisone Therapy in Pædiatrics.

INSTITUTE OF DERMATOLOGY
5.30 P.M. Dr. W. R. Bett: Medical Writing.

Friday, 1st

ROYAL SOCIETY OF MEDICINE
5.30 P.M. *Anæsthetics*. Dr. T. C. Gray, Dr. C. F. Scurr: Induced Hypothermia.

Appointments

FOUNTAIN, J. R., M.B. Edin., M.R.C.P.E.: senior registrar and tutor in general medicine, United Leeds Hospitals.

SCHOFIELD, T. L., CH.M. Lpool, F.R.C.S.: consultant surgeon, Bath clinical area.

SHEMILT, PHILIP, M.B. Lond., F.R.C.S.: surgical consultant, Military Hospital, Tidworth.

SMIDDY, F. G., M.B. Leeds, F.R.C.S.: senior registrar and tutor in general surgery, United Leeds Hospitals.

Sheffield Regional Hospital Board:

ASCROFT, N. O., M.B. Lpool: whole-time asst. chest physician, Wathwood Hospital, Wath-on-Dearne, near Rotherham.

BRITT, R. G., M.R.C.S., D.M.R.D.: part-time consultant radiologist, Leicester R.M.C.

COLLINS, JOHN, M.B. Lpool: whole-time senior casualty officer, Derbyshire Royal Infirmary.

FAHY, THOMAS, M.B. N.U.I.: whole-time asst. chest physician, Grimsby area.

JAMES, N. E., M.B. Lond., F.R.C.S.: consultant orthopædic surgeon, main centre, Grimsby.

KINSELLA, JOHN, L.R.C.P.I., D.M.R.T.: whole-time asst. radiotherapist, radiotherapy centre, Derbyshire Royal Infirmary.

MEJZNER, STEFAN, M.R.C.S.: whole-time asst. chest physician, Lincoln area, and deputy physician-superintendent, Branston Hall Hospital, Branston.

NAPIER, J. G., M.B. Edin., F.R.C.S.E., M.R.C.O.G.: consultant obstetrician and gynæcologist, Scunthorpe and District War Memorial Hospital, and Glandford Hospital, Brigg.

RENYARD, H. H., M.B., M.S Lond., F.R.C.S.: part-time consultant surgeon, Nottingham General and Newark Hospitals.

WILKINSON, J. B., B.M. Oxfd: whole-time asst. chest physician, Lincoln area.

Birmingham Regional Hospital Board:

ELLIOTT, J. R., M.R.C.S., F.F.A.R.C.S., D.A.: part-time consultant anæsthetist, Wolverhampton group.

HOLMES, J. MACDONALD, M.D. Leeds, F.R.C.P.: part-time consultant neurologist, West Bromwich group.

LASZLO, T. J., M.D., D.P.H. Prague: whole-time asst. geriatrician, Birmingham (Dudley Road) group.

ROAF, ROBERT, B.M. Oxfd, M.CH.ORTH. Lpool, F.R.C.S.: director of clinical studies and research and part-time orthopædic surgeon, Robert Jones and Agnes Hunt Orthopædic Hospital, Oswestry.

Appointed Factory Doctors:

BEETLES, B. N. A., M.B. Madras: Dagenham North, Essex.

HENRY, JOSEPH, M.B. Lond.: Bradford West, York.

WARD, J. A., M.R.C.S.: Syston, Leicester.

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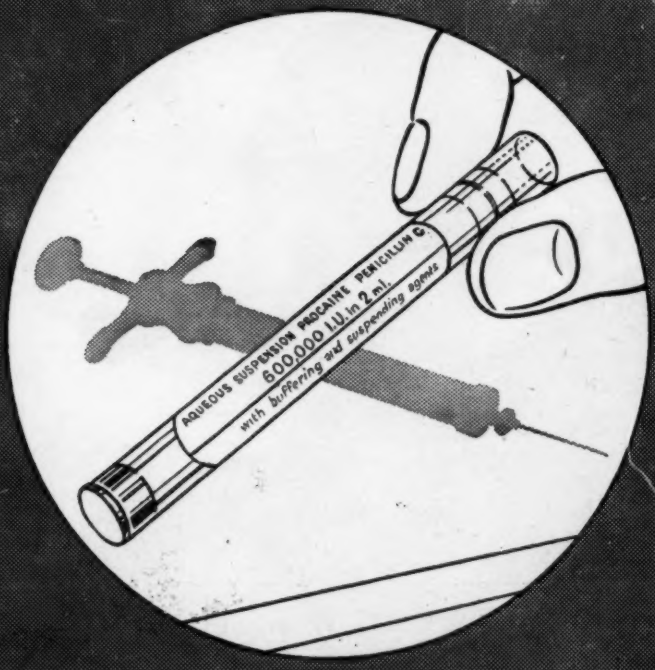

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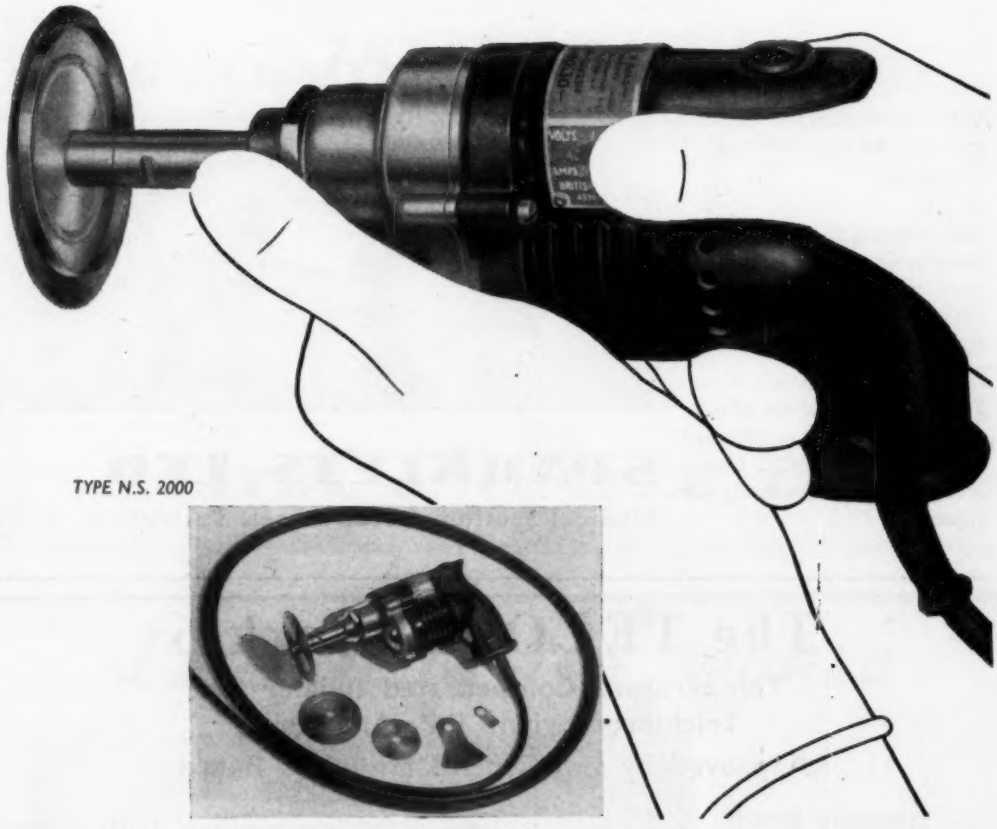

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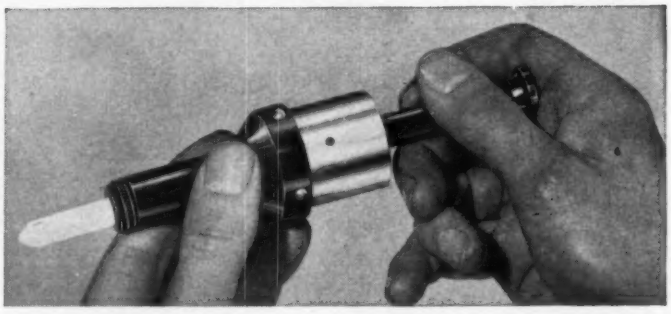

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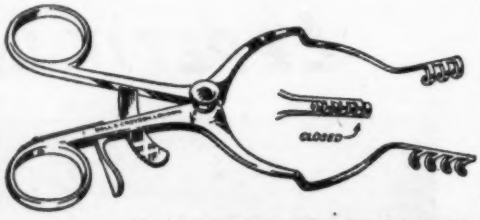

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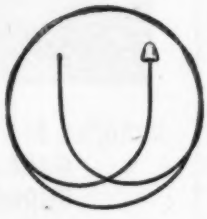

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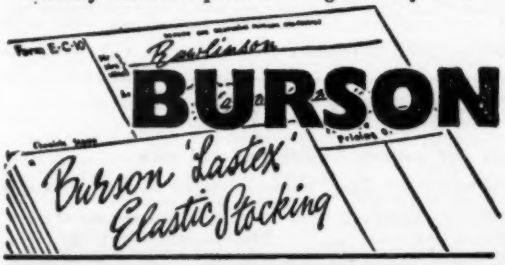

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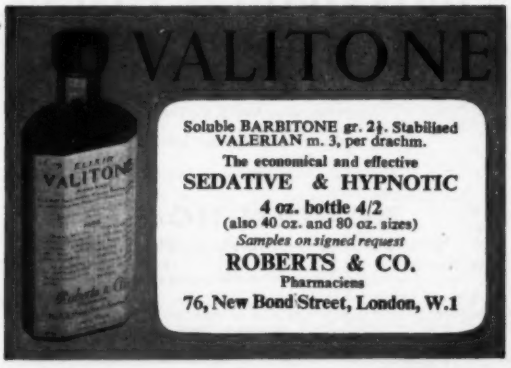

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Vacancies

ACADEMIC AND EDUCATIONAL SECTION	*Page* 42
ANÆSTHETICS	
Central Middlesex, N.W.10. Sr. H.O.	44
London, E.1. Sr. H.O.	44
Royal Free, W.C.1. Reg.	45
St. Thomas's, S.E.1. P.-t. Cons.	42
Birmingham R.H.B. Cons.	43
Bishop Auckland Gen. Sr. H.O.	46
Caerphilly Dist. Miners'. Clin. Assts.	47
Doncaster Royal Infy. Sr. H.O.	48
Dudley, Stourbridge & Dist. Sr. H.O.	48
Halifax Gen. Jr. H.M.O.	48
Isleworth. West Middlesex. H.O.	49
Leamington Spa. Warneford Gen. H.O.	48
Leeds United Hosps. Reg.	50
Leigh (Lancs) Infy. Sr. H.O.	49
Liverpool United Hosps. P.-t. Cons.	43
Manchester R.H.B. Cons.	43
Newcastle United Hosps. Sr. Reg. & Reg.	50
Newmarket Gen. Reg.	50
Scotland. South-Eastern R.H.B. Reg.	51
Scotland. Western R.H.B. Sr. H.M.O.	43
Stockport Infy. Sr. H.O.	52
Swindon & Dist. H.M.C. Sr. H.O.	52
CARDIOLOGY	
National Heart, W.1. Regs.	44
CASUALTY	
Hackney, E.9. H.O.	44
Lambeth, S.E.11. Sr. H.O. or H.O.	44
Putney, S.W.15. Sr. H.O.'s	44
St. Mary's, W.2. Reg.	45
Bedford Gen. Locum Reg.	46

Canterbury. Kent & Canterbury. Sr. H.O. 47
Chelmsford & Essex. Sr. H.O. .. 47
Colchester H.M.C. Sr. H.O.'s .. 47
Dudley, Stourbridge & Dist. Sr. H.O. 48
Grimsby Gen. Sr. H.O. 48
Hertford County. Sr. H.O. 48
Leeds. Public Dispensary & Hosp. Sr. H.O. 49
Maidstone. West Kent Gen. Sr. H.O. 50
Newport, Mon. Royal Gwent. Sr. H.O. 51
Nottingham Gen. Sr. H.O. 51
Perth Royal Infy. H.O. or Sr. H.O. 51
Pontefract Gen. Infy. Sr. H.O. .. 51
Portsmouth Group H.M.C. Locum Sr. H.O. 51
Slough. Upton. Locum Sr. H.O. .. 52
Southend Gen. Temp. Reg. 52
St. Albans City. Locum Casualty Officer 52
Torquay. Torbay. Sr. H.O. 52

CHEST AND TUBERCULOSIS
Brompton, S.W.3. Sr. H.O.'s or Regs. 44
Brompton, S.W.3. H.O.'s 44
Birmingham (Sanatoria) Group H.M.C. Jr. H.M.O. 46
Broxburn, West Lothian. Bangour Gen. H.O. 47
Colchester. British Legion San. Sr. H.O. 47
Driffield. Northfield San. Sr. H.O. .. 48
Leeds R.H.B. Reg. 49
Luton Chest Clinic. Reg. 49
Manchester R.H.B. P.-t. Cons. .. 43
Manchester R.H.B. Reg. 50
Middlesbrough. Poole. Jr. H.M.O. .. 50
Morpeth. Stannington Child's. Jr. H.M.O. 50
Scotland. Eastern R.H.B. Cons. .. 43
Welsh R.H.B. Sr. H.M.O. 44

DENTAL SURGERY
St. Bartholomew's, E.C.1. Reg. .. 45
Leeds United Hosps. P.-t. Cons. .. 43

DERMATOLOGY
Derby. Derbyshire Royal Infy. Reg. 47
Scotland. Eastern R.H.B. Reg. .. 51

EAR, NOSE, AND THROAT
Birmingham & Midland Ear & Throat. Sr. H.O. or H.O. 46
Birmingham R.H.B. Reg. 46
Brighton & Lewes H.M.C. Group Hosps. Sr. H.O. 47
Maidstone. Kent County Ophthalmic & Aural. Sr. H.O. 50
North East Met. R.H.B. P.-t. Cons. 43
Portsmouth Group H.M.C. Sr. H.O. 51
Stoke-on-Trent. North Staffs Royal Infy. Sr. H.O. 52

GENITO-URINARY
Bristol United Hosps. Sr. Reg. .. 47

GERIATRICS
Bolton & Dist. H.M.C. Jr. H.M.O. 46
Leeds R.H.B. Reg. 49
Rochford, Essex Gen. Locum Reg. .. 51
Watford. Shrodells. Sr. H.O. 53

INFECTIOUS DISEASES
Cardiff Isolation. Sr. H.O. 47
Sheffield. Lodge Moor. Reg. .. 52

MEDICINE
Bolingbroke, S.W.11. H.O. 44
Central Middlesex, N.W.10. H.O.'s .. 44
Mile End, E.1. H.O. 44
St. George-in-the-East, E.1. H.O. .. 45
St. Mary's, W.2. Reg. 45
Birmingham R.H.B. Sr. Reg. & Reg. 46
Bristol. Southmead Gen. Hosp. Group M.C. Sr. H.O. 47
Durham. Dryburn. H.O. 48
Enfield. Chase Farm. H.O. 48
Gainsborough. John Coupland. Jr. H.M.O. 48
Huntingdon County. H.O. 48
Luton. St. Mary's. Sr. H.O. 49
Newcastle United Hosps. Sr. Reg. .. 50
Poole Gen. Reg. 51
Romford. Rush Green. Sr. H.O. .. 51
Romford. Victoria. H.O. 51
Scotland. Eastern R.H.B. Cons. .. 43
Southampton Gen. H.O. 52
Stirling & Clackmannan Hosps. B.O.M. Sr. H.O. 52
Tredegar, Mon. St. James. H.O. .. 52
Wisbech. North Cambs. H.O. .. 53
New York, U.S.A. Doctor's Hosp. H.O.'s 53
New Zealand. Thames Hosp. Board. Sr. Reg. or Jr. Specialist 43

NEUROLOGY
National Hosps. for Nervous Diseases, W.C.1. Sr. Reg. 44

NEUROSURGERY
Guy's, Maudsley Hosps. & South East Met. R.H.B. Sr. Reg. .. 44
Leeds United Hosps. Reg. & Sr. H.O. 49

OBSTETRICS AND GYNÆCOLOGY
Elizabeth Garrett Anderson, N.W.1. Locum Reg. 44
Hosp. for Women, W.1. Sr. H.O. .. 44
Royal Free Hosp. Group. Reg. .. 45
Royal Free, W.C.1. Sr. Reg. 45
Aberdeen Maternity. Sr. H.O. .. 46
Birmingham R.H.B. Reg. 46
Birmingham United Hosps. Reg. .. 46
Bishop's Stortford. Haymeads. H.O. 46
Halifax Gen. Sr. H.O. 48
Hitchin. North Herts. Sr. H.O. .. 48
Isleworth. West Middlesex. Reg. .. 49
Leeds R.H.B. Reg. 49
Medway & Gravesend H.M.C. Temp. Reg. 50
Newcastle Gen. H.O. 50
Nottingham City. Sr. H.O. or H.O. .. 51
Salisbury Gen. H.O. 51
Windsor. King Edward VII. H.O. .. 53
New York, U.S.A. Doctor's Hosp. H.O.'s 53

OPHTHALMOLOGY
Moorfields, Westminster & Central Eye, E.C.1. Reg. 44
Brighton. Sussex Eye. Sr. H.O. & H.O. 47
Manchester United Hosps. Sr. H.M.O. 43
Manchester United Hosps. Sr. H.O. 50
Newcastle upon Tyne H.M.C. Sr. H.O. 50
Portsmouth Group H.M.C. Reg. .. 51
Wolverhampton Group. H.O. .. 53

ORTHOPÆDICS
Royal National Orthopædic (Stanmore). Sr. H.O.'s 45
Royal National Orthopædic, W.1. Sr. H.O.'s 45
Bournemouth & East Dorset H.M.C. Reg. 46
Bristol. Winford Orthopædic. Sr. H.O. 47
Chertsey. St. Peter's. Sr. H.O. or Pre-reg. H.O. 47
Durham County. H.O. 48
Farnborough, Kent. Sr. H.O. .. 48
Grimsby Gen. Sr. H.O. or Locum .. 48
Ipswich Borough Gen. Sr. H.O. .. 49
Ipswich. East Suffolk & Ipswich. Sr. H.O. & H.O. 49
Isleworth. West Middlesex. Sr. H.O. & Pre-reg. H.O. 49
Leeds R.H.B. Sr. H.M.O. 43
Leeds. St. James's. Sr. H.O. 49
Oxford. Wingfield-Morris Orthopædic. Sr. H.O. 50
Portsmouth Group H.M.C. H.O. .. 51
Sidcup. Queen Mary's. Sr. H.O. .. 52
Southend Gen. Sr. H.O. 52
Stoke-on-Trent. North Staffs Royal Infy. Sr. H.O. 52
Yorkshire. East Riding H.M.C. H.O. 53
New Zealand. Otago Hosp. Board. Sr. Reg. 53

PÆDIATRICS
Hosp. for Sick Child., W.C.1. Sr. H.O.'s & Reg. 45/46
Queen Elizabeth Hosp. for Child. M.C. Sr. H.O. & H.O.'s .. 44/45
St. James', S.W.12. H.O. 45
Bolton & Dist. H.M.C. H.O. 46
Carshalton. Queen Mary's Hosp. for Child. Sr. H.O. 47
Manchester. West Manchester H.M.C. Sr. H.O. 50
Newcastle United Hosps. Sr. H.O. .. 50
Nottingham City. Sr. H.O. 51
St. Albans City. H.O. 52
Wigan. Royal Albert Edward Infy. Sr. H.O. 53

PATHOLOGY
Royal Free, W.C.1. Sr. Reg. & Reg. 45
Birmingham Accident. Sr. H.O. .. 46
Birmingham United Hosps. Sr. H.O. 46
Manchester. West Manchester H.M.C. Sr. H.O. 50

PLASTIC SURGERY
Broxburn, West Lothian. Bangour Gen. H.O. 47

PSYCHIATRY
St. Mary's, W.2. P.-t. Reg. 45
Tavistock Clinic, W.1. Sr. Reg. .. 45
Birmingham. Highcroft Hall. Jr. H.M.O. 46
Bolton & Dist. H.M.C. Sr. H.O. .. 46
Epsom. St. Ebba's. Reg. 48
Epsom. West Park. Regs. 48
Lancaster Moor. Regs. 49
Leeds R.H.B. Reg. 49
Liverpool. Moss Side. Jr. H.M.O. or Reg. 49
Macclesfield. Parkside Mental. Reg. 50
Manchester R.H.B. Cons. 43
Newcastle R.H.B. Cons. 43
Oxford Univ. & R.H.B. Sr. Reg. .. 51
Sheffield. Middlewood. Jr. H.M.O. or Sr. H.O. 51
Sheffield R.H.B. Sr. H.M.O. 43
South-Western R.H.B. Cons. 43
Sutton, Surrey. Belmont. Reg. .. 52
Wakefield. Stanley Royd. Jr. H.M.O. 53
Warlingham Park H.M.C. Reg. .. 53
Welsh R.H.B. Sr. H.M.O. 44
Yorkshire. East Riding H.M.C. Jr. H.M.O. 53

RADIOLOGY
Brompton, S.W.3. P.-t. Reg. 44
King's College Hosp., S.E.5. Locum Reg. 44
Liverpool R.H.B. & United Hosps. Sr. H.M.O. 42
Sheffield R.H.B. Sr. Reg. 52
Sheffield United Hosps. Sr. Reg. .. 52

RADIOTHERAPY
Liverpool Radium Inst. Jr. H.M.O. .. 49
Sheffield R.H.B. Temp. Sr. Reg. .. 51

RHEUMATOLOGY
Taplow. Canadian Red Cross Mem. Sr. H.O. 52

SURGERY
Bethnal Green, E.2. H.O. 44
Hosp. for Sick Child., W.C.1. Sr. H.O.'s 46
Nelson, S.W.20. H.O. 45
North Middlesex, N.18. Locum Reg. 44
Royal Marsden, S.W.3. H.O.'s .. 45
South Lodge, N.21. H.O. 45
Ashington. Jr. H.M.O. 46
Birmingham. Dudley Road. Pre-reg. H.O. 46
Birmingham R.H.B. Regs. 46
Burton-on-Trent Gen. Pre-reg. H.O. 47
Caerphilly Dist. Pre-reg. H.O. .. 47
Canterbury. Kent & Canterbury. H.O. 47
Cardiff United Hosps. Sr. H.O. .. 47
Cardiff United Hosps. & Welsh R.H.B. Sr. Reg. 47
Carshalton. Queen Mary's Hosp. for Child. H.O. 47
Chelmsford & Essex. Pre-reg. H.O. .. 47
Cheltenham Gen. & Eye. H.O. .. 47
Colchester H.M.C. Sr. H.O.'s 47
Derby City. Pre-reg. H.O. or Sr. H.O. 47
Dorking Gen. Sr. H.O. 47
Dudley, Stourbridge & Dist. Sr. H.O. 48
East Anglian R.H.B. Regs. 48
Ellesmere Port. Jr. H.M.O. 48
Guildford Royal Surrey County. H.O. 48
Hertford County. Locum Reg. .. 48
Hillingdon, Middx. H.O. 48
Hounslow. Locum Reg. 48
Huntingdon County. H.O. 48
Kirkcaldy Gen. H.O. 49
Leeds R.H.B. Regs. 49
Medway & Gravesend H.M.C. Locum Reg. 50
Newton Abbot, S. Devon. Sr. H.O. .. 51
North East Met. R.H.B. P.-t. Cons. 43
Redhill, East Surrey. H.O. 51
Romford. Victoria. H.O. 51
Scotland. South-Eastern R.H.B. Sr. Reg. 51
Sheffield United Hosps. Reg. .. 52
Southampton. Royal South Hants. H.O. 52
South East Met. R.H.B. P.-t. Cons. 43
Stockport Infy. Sr. H.O. 52
Stockport. Stepping Hill. Sr. H.O.'s 52
Tynemouth Victoria Jubilee Infy. H.O. or Sr. H.O. 52
Walsall H.M.C. Locum H.O. 53
Whitehaven, Cumberland. H.O. or Sr. H.O. 53
Egypt. Harpur Mem. Surgeon 43
New York, U.S.A. Doctor's Hosp. H.O.'s 53

THORACIC SURGERY
Leeds R.H.B. Reg. 49
Welsh R.H.B. Sr. Reg. 53

UROLOGY
St. Peter's, St. Paul's, & St. Philip's, W.C.2. Reg. 45
Newcastle Gen. Sr. H.O. 50

VENEREOLOGY
St. Mary's, W.2. Sr. Reg. & Reg. .. 45

GENERAL
U.S.A. Bridgeport. Rotating Internships 53
U.S.A. St. Elizabeth Hosp. Elizabeth, N.J. Interns. 53

PUBLIC APPOINTMENTS 53
GENERAL PRACTICE 54
NON-MEDICAL 54
MISCELLANEOUS 54

Academic and Educational

FACULTY OF ANÆSTHETISTS
ROYAL COLLEGE OF SURGEONS OF ENGLAND

A postal ballot was held on WEDNESDAY, 16TH MARCH, 1955, at the College in connection with the election of 3 Fellows to the Board.

As a result of the ballot the following have been elected :
Dr. ARTHUR JOHN WELLS BEARD, London.
Dr. ROBERT WILLIAM COPE, London.
Dr. ARCHIBALD HERBERT GALLEY, London.

UNIVERSITY OF LONDON

A LECTURE on " Specific Inhibition of Adrenergic Responses " will be given by Prof. MARK NICKERSON (Manitoba) at 5 P.M. on 30TH MARCH at St. Thomas's Hospital Medical School, Albert Embankment, S.E.1.

Admission free, without ticket.

JAMES HENDERSON, Academic Registrar.

THE UNIVERSITY OF LIVERPOOL
FACULTY OF MEDICINE
DEPARTMENT OF ANÆSTHESIA

A COURSE OF POSTGRADUATE INSTRUCTION IN ANÆSTHESIA, limited to 10 students, will be conducted at the University of Liverpool lasting for 1 academic year and commencing 1ST OCTOBER, 1955. This course gives theoretical and practical instruction to students intending to sit for the Diploma or the Fellowship of the Faculty of Anæsthetists. For the purpose of gaining practical experience, the students will be found suitable appointments in recognised General Hospitals within the Liverpool area.

The fee for the course is £60.

Application forms may be obtained from the Reader in Anæsthesia, The University, Liverpool, 3, and should be returned not later than 30th April, 1955.

UNIVERSITY COLLEGE DUBLIN

PROFESSORSHIP OF SOCIAL AND PREVENTIVE MEDICINE

Applications are invited by the Governing Body of University College Dublin for the above statutory office.

Applicants must forward to the Secretary and Bursar, University College Dublin, 150 copies of their applications and testimonials to be received by him not later than 15TH MAY, 1955.

The attention of candidates is drawn to the fact that full details of qualifications and experience with supporting testimonials should be given in their applications.

Further particulars may be obtained from J. P. MACHALE, Secretary and Bursar, University College Dublin.

UNIVERSITY OF ST. ANDREWS

REFRESHER COURSE FOR GENERAL PRACTITIONERS

A 2 weeks course will be held in Queen's College, Dundee, and associated hospitals from 20TH JUNE to 1ST JULY, 1955. Teaching will be by lecture-demonstrations and clinical rounds, with emphasis on recent advances in diagnosis and treatment. Accommodation available in students' residences at moderate cost. Course fee £10 10s. Financial assistance, subject to certain conditions, from Department of Health for Scotland. Last date for enrolment, 30th April, 1955.

Further particulars and application forms from Postgraduate Convener, Department of Pharmacology and Therapeutics, Queen's College, Dundee.

SOCIETY OF APOTHECARIES OF LONDON

DIPLOMA IN INDUSTRIAL HEALTH

The next Examination will begin on MONDAY, 4th JULY, 1955. The following Examination will be held in December, 1955.

For Regulations apply Registrar, Apothecaries' Hall, Black Friars-lane, London, E.C.4.

UNIVERSITY OF LONDON. The Senate invite applications for the READERSHIP IN SURGERY tenable at St. Bartholomew's Hospital Medical College (basic salary £1900–£100–£2400 a year).

Applications (10 copies) must be received not later than 9th May, 1955, by the Academic Registrar, University of London, Senate House, W.C.1, from whom further particulars may be obtained.

THE UNIVERSITY OF LIVERPOOL. Applications are invited for the post of LECTURER in the Department of Bacteriology. A medical qualification is not essential. The initial salary will be within the range £650–£1200 p.a., according to qualifications and experience.

Applications, stating age, qualifications, and experience, together with the names of 3 referees, should be received not later than 15th April, 1955, by the undersigned, from whom further particulars of the conditions of appointment may be obtained. STANLEY DUMBELL, Registrar.

UNIVERSITY OF DURHAM. Board of Governors of THE UNITED NEWCASTLE UPON TYNE HOSPITALS. NEWCASTLE REGIONAL HOSPITAL BOARD. Applications are invited for the CHAIR OF PSYCHOLOGICAL MEDICINE tenable in the Newcastle Division of the University. The person appointed will hold by Honorary contract the position of Consultant to the United Newcastle upon Tyne Hospitals and the Regional Hospital Board. Salary in accordance with the scale for Clinical Professors (£2500–£2850 a year ; in exceptional cases £3100) with membership of F.S.S.U.

Further particulars may be obtained from the undersigned, with whom 20 copies of applications, giving the names of 3 persons to whom reference may be made, should be lodged not later than 23rd April, 1955. Applicants outside the United Kingdom may submit 1 copy only.

E. M. BETTENSON, Registrar.

University Office, 46, North-bailey, Durham.

THE UNIVERSITY OF MANCHESTER. Applications are invited for the post of LECTURER or ASSISTANT LECTURER in the Clinical Section of the Rheumatism Research Centre. Salary : Lecturer, on a scale rising to £2000 p.a. ; Assistant Lecturer, £700–£100–£1100 p.a. Status and initial salary according to qualifications and experience. Membership of the F.S.S.U. and children's allowance scheme.

Applications should be sent not later than 11th April, 1955, to the Registrar, The University, Manchester, 13, from whom further particulars and forms of application may be obtained.

UNIVERSITY OF EDINBURGH. Department of Child LIFE AND HEALTH. Applications are invited from medical graduates holding a higher medical qualification, for the post of Full-time LECTURER in the Department of Child Life and Health. The duties will be those of teaching, care of patients and prosecution of research under the Professor of Child Life and Health. The appointment will carry the clinical status of Assistant Senior Registrar. Salary (presently subject to review) will be in the range £1100–£1500 p.a., with placement according to experience and qualifications and with superannuation benefit and family allowance where applicable.

Further particulars may be obtained from the undersigned with whom applications, giving the names of 2 referees, should be lodged not later than 9th April, 1955.

CHARLES H. STEWART, Secretary to the University.

UNIVERSITY OF EDINBURGH. Department of Medicine. Applications are invited from medical graduates for appointment to the post of ASSISTANT in the Department of Medicine, for a period of 6 months commencing 1st April, 1955. Ample opportunities for clinical work will be available. Salary at the rate of £450 p.a.

Applications, giving the names of 2 referees, should be lodged with the undersigned as soon as possible.

CHARLES H. STEWART, Secretary to the University.

UNIVERSITY COLLEGE HOSPITAL MEDICAL SCHOOL. DENTAL DEPARTMENT. Applications are invited for the appointment of FIRST ASSISTANT (whole-time), in the Professorial Dental Unit. Work will consist mainly in teaching in the Conservation Department and research. The appointment, which is of Senior Lecturer grade in the University of London, will commence on 1st October, 1955. Salary at commencing rate of not less than £1500 p.a., plus superannuation and children's allowance.

Applications, with names of 2 referees, should be sent to the Secretary of University College Hospital Medical School, University-street, London, W.C.1, not later than Saturday, 23rd April, 1955.

BURDEN NEUROLOGICAL INSTITUTE, Bristol. Required, a medical officer interested in research in neuropsychiatry to act as ASSISTANT at the above Institute. Initial appointment for 1 year. Opportunities for research work in neurology, electrophysiology and psychiatry.

Applications to be made to the Director of the Institute.

ROYAL COLLEGE OF MEDICINE, Baghdad, Iraq. Applications are invited from British candidates for the following posts, to be filled in October, 1955 :—

CHAIR OF PATHOLOGY.

CHAIR OF NEUROLOGY AND PSYCHIATRY.

Candidates must have appropriate British qualifications and relevant teaching experience in the United Kingdom. Maximum annual salary for each post equivalent to £3600, at present rate of exchange (1 Iraqi Dinar = £1 sterling). Annual allowances for : high cost of living £120–£168 ; housing up to £144 ; leave £40–£60. Contract with Iraqi Government, initially for 1–3 years by agreement, and renewable. First-class return fares paid, also for wife and 2 children. Contributory provident fund (Government 10%, employee 5%).

Further particulars and application form from Director, Personnel Department, The British Council, 65, Davies-street, London, W.1.

THE UNIVERSITY COLLEGE OF KHARTOUM, Sudan. Applications are invited for appointment to CHAIR OF PUBLIC HEALTH. Salary £E2625 p.a. Cost-of-living allowance now approximately £E150 p.a. Outfit allowance £50 on first appointment. Passages for appointee and family on appointment, termination, and annual leave. Appointment on contract for 3–7 years (renewable) with bonus on completion (1 months salary for each year of service).

Detailed applications (8 copies), naming 3 referees, to be received by 22nd April, 1955, by Secretary, Inter-University Council, 1, Gordon-square, London, W.C.1, from whom further information may be obtained.

Hospital Services : Senior Appointments

ST. THOMAS'S HOSPITAL, London, S.E.1. Anæsthetist. Consultant status with membership of the Medical Committee. 6 sessions per week.

Applications (12 copies), including names and addresses of 3 referees, to the Clerk of the Governors by 3rd April, 1955.

LIVERPOOL REGIONAL HOSPITAL BOARD. The UNITED LIVERPOOL HOSPITALS. Applications are invited for the whole-time post of ASSISTANT RADIOLOGIST for Pædiatric Radiology. Duties will be mainly at Alder Hey Children's Hospital and the Royal Liverpool Children's Hospital, but will include 1 adult session at Mill Road Hospital. Applicants must possess a registrable qualification and a Diploma in Radiology and have had wide experience in the radiology of children. The possession of a higher medical or surgical qualification will be considered an advantage. Salary £1500 (at age 32)–£50–£1950.

Forms of application from, and to be returned to, Dr. T. Lloyd Hughes, Senior Administrative Medical Officer, Liverpool Regional Hospital Board, 19, James-street, Liverpool, 2, to be received not later than 16th April, 1955.

VINCENT COLLINGE, Secretary to the Board.

BIRMINGHAM REGIONAL HOSPITAL BOARD. Birmingham (Selly Oak) Group. SENIOR CONSULTANT ANÆSTHETIST (whole-time) in charge of Anæsthetic Services Little Bromwich Hospital (158 general beds increasing to 476; 214 beds for infectious diseases), Centre for treatment of poliomyelitis cases. Experience respiratory problems of poliomyelitis an advantage.

Applications (15 copies), stating name, age, nationality, qualifications, present and previous appointments, and details of 3 referees, to Secretary, 10, Augustus-road, Birmingham, 15, before 11th April, 1955.

LEEDS REGIONAL HOSPITAL BOARD. Whole-time appointment of ASSISTANT ORTHOPÆDIC SURGEON (Senior Hospital Medical Officer scale) for duties at hospitals in the Pontefract and Castleford Group. The person appointed to reside in or near Pontefract.

Applications (12 copies), stating age, qualifications and details of appointments held showing dates, with names and addresses of 3 referees, to the Secretary, Park-parade, Harrogate, by 23rd April, 1955.

LEEDS. THE UNITED LEEDS HOSPITALS. The General Infirmary at Leeds. Applications are invited for the appointment of a CONSULTANT ASSISTANT DENTAL SURGEON with special experience in prosthetic dentistry. The contract would be for 1, 2 or 3 nominal sessions per week, and in accordance with the terms and conditions of service of hospital dental staff.

Full details of experience (with relative dates) should accompany applications, stating age, and giving 3 names for reference, and should be forwarded to the Secretary to the Board, The General Infirmary at Leeds, Leeds, 1, by not later than 16th April, 1955.

LIVERPOOL. THE UNITED LIVERPOOL HOSPITALS. Applications are invited for appointments as CONSULTANT ANÆSTHETISTS. Each appointment is for 4 sessions. Candidates must possess a registrable qualification and the Fellowship of the Faculty of Anæsthetists of the Royal College of Surgeons of England.

Applications, giving full particulars of age, qualifications and details of present and previous appointments, should be accompanied by the names of 3 persons to whom reference may be made and should reach the Secretary, 80, Rodney-street, Liverpool, 1, not later than 9th April, 1955.

MANCHESTER REGIONAL HOSPITAL BOARD.

(*a*) Part-time (8 half-days) post of CONSULTANT CHEST PHYSICIAN to the Burnley and District Hospital Centre. Successful applicant will be in charge of the Chest (including pulmonary tuberculosis) Diseases Service in the area, chest clinics in Burnley and neighbouring hospitals and pulmonary tuberculosis beds at Marsden Hospital and will have beds in the general medical wards at Burnley General Hospital. Good training and experience in general medicine, special experience in chest diseases and Membership of a Royal College of Physicians essential. 18th April, 1955.

(*b*) Whole-time or maximum part-time post of CONSULTANT ANÆSTHETIST to the Wigan and Leigh Hospital Centre (Royal Albert Edward Infirmary, Wigan, Leigh Infirmary, &c.) and at Wrightington Hospital (thoracic and orthopædic surgery). Wide experience and higher qualification in anæsthetics essential. Appointee to live in area. 11th April, 1955.

(*c*) Whole-time or maximum part-time (9 half-days) resident post of CONSULTANT PSYCHIATRIST AND MEDICAL SUPERINTENDENT to Whittingham Hospital, near Preston (about 3000 Beds) AND CONSULTANT PSYCHIATRIST to Blackpool and Fylde Hospital Management Committee, with clinics at Victoria Hospital, Blackpool. Building has commenced on a modern house in the grounds. Applicants must be of high professional standing with wide experience and possess higher qualifications. 14th April, 1955.

Application forms from the Senior Administrative Medical Officer to the Board at Cheetwood-road, Manchester, 8, to be returned by dates stated.

MANCHESTER. UNITED MANCHESTER HOSPITALS. Manchester Royal Eye Hospital. Applications are invited for the post of Full-time SENIOR HOSPITAL MEDICAL OFFICER (non-resident). Previous experience in ophthalmology essential. The terms and conditions of service for hospital medical and dental staffs will apply.

Applications, giving details of past experience and qualifications, together with the names of 3 referees, to be addressed to the undersigned as early as possible. (Special application forms can be obtained on request.)

F. J. Cable, Secretary, United Manchester Hospitals.

NEWCASTLE REGIONAL HOSPITAL BOARD. St. Luke's Hospital, Middlesbrough. (547 Beds.) CONSULTANT PSYCHIATRIST in Child Guidance (whole-time, or maximum part-time). The person appointed will work in the Children's Outpatient Department of the Hospital and in association with local education authority clinics in the North Riding of Yorkshire. The Regional Hospital Board have acquired a property which they propose to convert to an Inpatient Unit for emotionally disturbed children. Further particulars from Regional Psychiatrist.

Applications, with names and addresses of 3 referees, to Regional Psychiatrist, "Blythswood South," Osborne-road, Newcastle upon Tyne, 2, within 28 days.

NORTH EAST METROPOLITAN REGIONAL HOSPITAL BOARD.

Part-time CONSULTANT E.N.T. SURGEON (1 session a week) Brentwood District Hospital, Brentwood, Essex. Preference will be given to candidates living within easy access of the Hospital.

Part-time CONSULTANT SURGEON (7 sessions a week), Harold Wood Hospital, Gubbins-lane, Harold Wood, Essex. The successful candidate will be required to take up residence in the area.

Separate applications (6 copies), stating post concerned, and names of 3 referees, should reach the Secretary, 11A, Portland-place, London, W.1, by Saturday, 9th April, 1955.

SCOTLAND. EASTERN REGIONAL HOSPITAL BOARD. Medicine. Dundee Royal Infirmary and Maryfield Hospital, Dundee. Applications are invited for the post of ASSISTANT PHYSICIAN (Consultant) at Dundee Royal Infirmary (510 Beds) and Maryfield Hospital, Dundee (400 Beds), general teaching hospitals associated with the University of St. Andrews. The duties of the appointment will cover work in the wards and Outpatient Department in Dundee Royal Infirmary and in the Unit of the Professor of Therapeutics at Maryfield Hospital, and also responsibility as Visiting Physician to Westgreen (Mental) Hospital, by Dundee (660 Beds). Clinical teaching duties are associated with the appointment. The post will be on a whole-time or maximum part-time basis in the option of the successful candidate.

Further particulars and forms of application may be obtained from the Secretary to the Board, 430, Blackness-road, Dundee, with whom applications must be lodged not later than 19th April, 1955.

SCOTLAND. EASTERN REGIONAL HOSPITAL BOARD. Chest and Tuberculosis. Applications are invited for the whole-time appointment of a CHEST PHYSICIAN (Consultant) for duty in the Tuberculosis Service in the Dundee and Arbroath area. Duties are in respect of both inpatients and outpatients and the person appointed must be prepared to undertake certain teaching duties on behalf of the University of St. Andrews. Salary in accordance with the recognised scale for Consultants. Other conditions of service in accordance with national agreement.

Forms of application and further particulars from the Secretary, "Braeknowe," 430, Blackness-road, Dundee, with whom applications must be lodged not later than 19th April, 1955.

SCOTLAND. WESTERN REGIONAL HOSPITAL BOARD. Applications are invited for the appointment of Whole-time ASSISTANT ANÆSTHETIST based at the Victoria Infirmary, Glasgow, and at Hairmyres Hospital, East Kilbride. Salary (at age 32 and over) on the scale £1500–£50–£1950. This appointment is subject to the National Health Service (Scotland) superannuation regulations.

Applications (16 copies), stating date of birth, qualifications, experience, present appointment, and the names of 3 referees, to reach the Secretary, Western Regional Hospital Board, 64, West Regent-street, Glasgow, not later than 30 days after the publication of this advertisement.

SHEFFIELD REGIONAL HOSPITAL BOARD. Whole-time SENIOR ASSISTANT PSYCHIATRIST required for the Coppice Hospital, Mapperley, Nottingham. A newly built house on the Hospital estate is available. Salary scale £1500–£50–£1950.

Application forms and further details obtainable from Senior Administrative Medical Officer, Sheffield Regional Hospital Board, Old Fulwood-road, Sheffield, 10. Forms to be returned by 22nd April, 1955.

SOUTH EAST METROPOLITAN REGIONAL HOSPITAL BOARD. Applications are invited for an appointment as Part-time CONSULTANT GENERAL SURGEON for 6 notional half-days a week in the Brighton and Lewes Group of hospitals, commencing on 1st September, 1955. Candidates must have had wide experience in general surgery, including children's work, and be Fellows of a Royal College of Surgeons. Applicants may visit the hospitals concerned.

Apply, stating nationality, age, sex, qualifications and experience, including details of present appointment and of war service, together with the names and addresses of 3 referees, to the Secretary, Advisory Appointments Committee, South East Metropolitan Regional Hospital Board, 11, Portland-place, W.1, not later than 9th April, 1955.

SOUTH-WESTERN REGIONAL HOSPITAL BOARD. Appointment of Medical Superintendent to Sandhill Park Hospital Group, Bishops Lydeard, near Taunton. Applications are invited from registered medical practitioners for the appointment of a Whole-time CONSULTANT PSYCHIATRIST at Sandhill Park Hospital, Bishops Lydeard. This Hospital with its ancillary units contains approximately 797 Beds for mental defectives. Applicants will be required to undertake the duties of Consultant Psychiatrist and the statutory responsibilities prescribed by the Mental Deficiency Acts and Regulations. A modern detached house near the Hospital will be available.

Applications (12 copies), stating date of birth, qualifications and experience, together with 12 copies of 2 testimonials, and the names and addresses of 2 referees, should be sent to the Secretary of the Regional Hospital Board, 27, Tyndalls Park-road, Bristol, 8, not later than 12th April, 1955.

NEW ZEALAND. THAMES HOSPITAL BOARD. Applications are invited from registered medical practitioners for the full-time appointment of ASSISTANT MEDICAL SUPERINTENDENT, Thames Hospital. It is desirable that main interests of the appointee should lie in medicine and anæsthetics. Salary in accordance with Hospital Employment Regulations as either Senior Registrar £NZ887 12s.–£NZ1002 12s., plus board and lodging if single and furnished residence if married; or Junior Specialist £NZ1371 7s.–£NZ1671 7s., with residence available and heat and light and furniture at a deduction of £178 10s. Duties to commence 1st July, 1955. Conditions of appointment and form of application may be obtained from the Office of the High Commissioner for New Zealand, 415, Strand, London, W.C.2, England, or the undersigned.

Applications addressed to the Secretary, P.O. Box 53, Thames, should be posted air-mail and close on Monday, 2nd May, 1955.

F. Hopkinson, Secretary, Thames Hospital Board.
Thames, New Zealand.

EGYPT. HARPUR MEMORIAL HOSPITAL, Old Cairo (Church Missionary Society). (200 Beds, 3 theatres.) Experienced SURGEON (Male—preferably under 60) wanted to take charge of surgery, with Egyptian colleagues, for a period of 3–5 years.

Applications invited from convinced Christians, to the Medical Superintendent, Church Missionary Society, 6, Salisbury-square, London, E.C.4, from whom further details are available.

WELSH REGIONAL HOSPITAL BOARD. Whole-time ASSISTANT CHEST PHYSICIAN (Senior Hospital Medical Officer) based at Cardiff Chest Clinic, to serve Cardiff Hospital Management Committee area. Successful candidate will work under direction of Consultant Chest Physician.

Applications (12 copies), naming 3 referees, to Senior Administrative Medical Officer, Temple of Peace, Cathays Park, Cardiff, within 21 days.

WELSH REGIONAL HOSPITAL BOARD. Whole-time ASSISTANT PSYCHIATRIST (Senior Hospital Medical Officer), Morgannwg Hospital, Bridgend, Glam. (2200 Beds). Accommodation available for single or married persons. Hospital possesses Neurosis Centre, Child Guidance Clinic, Psychological Department, extensive Outpatient Clinics, well-equipped Pathological and Electro-encephalographic Laboratories and social clubs.

Applications (12 copies), naming 3 referees, to Senior Administrative Medical Officer, Temple of Peace, Cathays Park, Cardiff, within 21 days.

Hospital Services : Junior Appointments

BETHNAL GREEN HOSPITAL, Cambridge Heath-road, London, E.2. (Acute—309 Beds.) HOUSE SURGEON. Post recognised for F.R.C.S. and pre-registration purposes.

Applications, stating age, nationality, qualifications and experience, with copies of 2 testimonials, to the Hospital Secretary.

BOLINGBROKE HOSPITAL, Wandsworth Common, S.W.11. HOUSE PHYSICIAN (resident), vacant 30th April, 1955. Open to registered practitioners and pre-registration candidates.

Apply Hospital Secretary, enclosing copies of 3 recent testimonials, by 4th April.

BROMPTON HOSPITAL, S.W.3. Applications invited for the following posts :—

NON-RESIDENT HOUSE PHYSICIAN for which there are 3 vacancies, for 6 months from 1st June. Duties include work in Outpatient Department and wards. Salary £475 or £525 a year, according to experience.

RESIDENT SURGICAL OFFICER (post graded as Senior House Officer or Registrar, according to qualifications and experience), for which there are 2 vacancies, for 6 months from 1st May with eligibility for reappointment. Candidates must have held a resident hospital appointment.

Applications, stating age, qualifications with dates, nationality and appointments held, together with copies of testimonials, by 9th April to—

KENNETH A. F. MILES, House Governor.

BROMPTON HOSPITAL, S.W.3. Applications are invited for the post of Part-time RADIOLOGICAL REGISTRAR for attendance up to 6 sessions weekly, for 1 year in the first instance. Candidates are required to hold a Diploma in Diagnostic Radiology.

Applications, stating age, qualifications, nationality and appointments held with dates, and copies of 3 testimonials, by 2nd April to KENNETH A. F. MILES, House Governor.

CENTRAL MIDDLESEX HOSPITAL, Park Royal, N.W.10. SENIOR HOUSE OFFICER (Anæsthetist). Whole-time, resident, for 6 months, renewable. Previous experience in anæsthesia essential. The Hospital is recognised for the D.A. and F.F.A.R.C.S.

Applications, with copies of 2 testimonials or names of 2 referees, to Medical Director by 9th April, 1955.

CENTRAL MIDDLESEX HOSPITAL, Park Royal, N.W.10. RESIDENT HOUSE OFFICER required in General Medical and Cardiological Department. Appointment for 6 months from 6th May, 1955.

Applications, with 1 copy of 2 testimonials, to Medical Director by 2nd April, 1955.

CENTRAL MIDDLESEX HOSPITAL, Park Royal, N.W.10. RESIDENT HOUSE OFFICER required in General Medical Department, including hæmatology and endocrinology. Appointment for 6 months from 1st May, 1955.

Applications, with copies of 2 testimonials, to Medical Director by 2nd April, 1955.

ELIZABETH GARRETT ANDERSON HOSPITAL, Euston-road, N.W.1. (ROYAL FREE HOSPITAL GROUP.) Locum REGISTRAR in Obstetrics and Gynæcology required immediately. Resident appointment. Applicants must be registered Women medical practitioners. Salary in accordance with Ministry of Health scale.

Apply as soon as possible to Secretary, Elizabeth Garrett Anderson Hospital, Euston-road, N.W.1 (Telephone : EUSton 2501).

GUY'S HOSPITAL, MAUDSLEY HOSPITAL AND THE SOUTH EAST METROPOLITAN REGIONAL HOSPITAL BOARD. Applications are invited to fill an established vacancy as SENIOR REGISTRAR in Neurosurgery. The appointment will be made jointly by the bodies concerned and will be held for the first and fourth years at the Guy's-Maudsley Neurosurgical Unit and for the intermediate years at the Regional Neurosurgical Centre at the Brook Hospital. The appointment will commence on 1st May, 1955, and will be subject to annual renewal. Applicants should have had Registrar experience in neurosurgery and should have a higher surgical qualification.

Please apply to the House Governor and Secretary, Maudsley Hospital, Denmark-hill, S.E.5, for form of application, returnable by 15th April, 1955.

HACKNEY HOSPITAL, London, E.9. (General—844 Beds.) Applications for the 6 months appointment of CASUALTY OFFICER AND E.N.T. HOUSE SURGEON (House Officer grade), now vacant, should reach the Group Secretary at above address, as soon as possible, quoting HH/CHO.

HOSPITAL FOR WOMEN, Soho-square, W.1. (Affiliated to the Middlesex Hospital.) Applications are invited for a full-time post of RESIDENT SENIOR GYNÆCOLOGICAL HOUSE OFFICER, vacant on 1st July, 1955. Appointment is for 6 months but the holder can apply for an extension of 6 months. Salary in accordance with the terms laid down for medical and dental staffs, less a deduction of £125 p.a for residential emoluments. The appointment is recognised for the M.R.C.O.G. examination.

Applications, stating age, nationality, qualifications and experience, supported by the names and addresses of 2 referees, must reach the undersigned not later than Wednesday, 13th April. D. C. EMERY, Secretary.

KING'S COLLEGE HOSPITAL, Denmark-hill, S.E.5. Applications are invited for the post of Locum REGISTRAR in Radiology. The appointment, which is subject to the terms and conditions of service for medical and dental staffs, will be vacant from 18th April, 1955, to 30th September, 1955.

Applications, stating age, education, qualifications and experience, with the names of 2 referees, should be sent to the undersigned by 9th April, 1955.

S. W. BARNES, House Governor.

LAMBETH HOSPITAL, Brook-drive, S.E.11. Applications are invited for appointment as RESIDENT CASUALTY OFFICER, vacant 1st May, 1955. The position is graded as Senior House Officer or House Officer, according to experience, recognised for the F.R.C.S.

Forms of application from the Physician-Superintendent on receipt of a stamped addressed envelope.

LONDON HOSPITAL, Whitechapel, E.1. Applications are invited for the post of SENIOR HOUSE OFFICER to the Department of Anæsthetics becoming vacant on 10th May, 1955.

Applications (6 copies), giving full particulars, together with 6 copies of 3 recent testimonials, should be received by the House Governor by 12th April, 1955.

H. BRIERLEY, House Governor.

MILE END HOSPITAL, Bancroft-road, E.1. (475 Beds.) HOUSE PHYSICIAN (pre- or post-registration) required for duty on 3rd May, 1955.

Application forms, obtainable from the Physician-Superintendent, to be returned by 8th April, 1955, with copies of not more than 3 testimonials.

MOORFIELDS, WESTMINSTER AND CENTRAL EYE HOSPITAL (MOORFIELDS BRANCH), City-road, London, E.C.1. Applications are invited for the post of SIXTH HOUSE SURGEON (Registrar), non-resident. The appointment is for a period of 4 months from 1st July, 1955, and the holder of the post at the completion of that time will be eligible for appointment as Fifth, Fourth, Third, Second House Surgeon and subsequently as Senior Resident Officer, for similar periods.

Applications should be submitted on the official form obtainable from the undersigned, stating age and qualifications, together with testimonials and photograph, and be received not later than 13th April, 1955.

A. J. M. TARRANT, House Governor.

NATIONAL HEART HOSPITAL, Westmoreland-street, W.1 (with which is associated the Institute of Cardiology). The Board of Governors invites applications to fill 2 vacancies in the post of REGISTRAR as from 1st June, 1955. Applicants should have been fully trained in general medicine and should possess a higher medical qualification. Opportunities for research are available.

Applications, with copies of 3 recent testimonials, should be sent to me not later than Saturday, 16th April, 1955.

ROBERT G. E. WHITNEY, Secretary to the Board.

NATIONAL HOSPITALS FOR NERVOUS DISEASES. Applications are invited from registered medical practitioners for the appointment of ASSISTANT REGISTRAR (whole-time) to the Outpatients' Department at The National Hospital, Queen-square, W.C.1. This post carries the grade of Senior Registrar. The appointment will be for 1 year in the first instance.

Applications, giving the names of 3 referees, to be sent to the undersigned not later than 16th April, 1955.

H. EWART MITCHELL, Secretary to the Board of Governors.
The National Hospitals for Nervous Diseases,
Queen-square, W.C.1.

NORTH MIDDLESEX HOSPITAL, Edmonton, N.18. Locum REGISTRAR in Surgery required immediately ; for several weeks. Higher qualification in surgery essential. Work consists mainly of general and traumatic surgery.

Applications, stating age, nationality, qualifications, experience, with copies of recent testimonials and/or names of 2 referees, to Secretary of Hospital.

PUTNEY HOSPITAL, Lower Common, S.W.15. Casualty OFFICER AND E.N.T. HOUSE SURGEON (non-resident, Senior House Officer grade) vacant 25th April. Recognised for F.R.C.S.

Applications, enclosing copies of 3 recent testimonials, to Hospital Secretary by 6th April.

PUTNEY HOSPITAL, Lower Common, S.W.15. Casualty OFFICER AND FRACTURE HOUSE SURGEON (non-resident, Senior House Officer grade), vacant 3rd May. Recognised for F.R.C.S.

Applications, enclosing copies of 3 recent testimonials, to Hospital Secretary by 6th April.

QUEEN ELIZABETH HOSPITAL FOR CHILDREN MANAGEMENT COMMITTEE, Hackney-road, E.2, Shadwell, E.1, and BANSTEAD WOOD, SURREY. Applications are invited for the appointment of RESIDENT MEDICAL OFFICER (Male or Female) graded Senior House Officer, at Shadwell, E.1, to become vacant 1st June, 1955. Candidates must have had experience in the treatment of sick children. The appointment will be for 1 year.

Application forms may be obtained from the Secretary at Hackney-road, and should be returned, with copies of not more than 3 testimonials, not later than 7th April, 1955.

QUEEN ELIZABETH HOSPITAL FOR CHILDREN MANAGEMENT COMMITTEE, Hackney-road, E.2, Shadwell, E.1, and BANSTEAD WOOD, SURREY. HOUSE OFFICERS (2). Appointments will be made for 2 consecutive periods of 6 months commencing 1st June, 1955. First period as House Physician and second as House Surgeon and Casualty Officer.

Application forms may be obtained from the Secretary at Hackney-road and should be returned with copies of not more than 3 testimonials on or before 12th April, 1955.

NELSON HOSPITAL, Kingston-road, Merton, S.W.20. HOUSE SURGEON (resident), vacant end of April. Post recognised for F.R.C.S.

Applications, stating age, qualifications, &c., with the names and addresses of 2 referees, to be sent to the Secretary at the above address.

ROYAL FREE HOSPITAL. Applications are invited for the post of SENIOR REGISTRAR to the Gynæcological and Obstetric Department. The post is full-time and recognised under the Senior Registrar establishment. Duties to commence 1st July, 1955. Candidates should be members of the Royal College of Obstetricians and Gynæcologists.

Applications, together with names of 3 referees, should be sent to the Board of Governors, Royal Free Hospital, Gray's Inn-road, W.C.1, not later than 7th April, 1955.

ROYAL FREE HOSPITAL, London, W.C.1. Applications from registered medical practitioners (Men or Women) are invited for the post of Whole-time NON-RESIDENT SENIOR REGISTRAR in Clinical Pathology. Appointment for 1 year in the first instance, from 1st September, 1955. Experience in clinical pathology and in addition, special training in bacteriology is essential.

Applications should be sent to the Secretary to the Board of Governors at the above address, not later than Monday, 2nd May, 1955.

ROYAL FREE HOSPITAL, London, W.C.1. Applications are invited for the post of REGISTRAR to the Anæsthetic Department, vacant on 1st May. The post is resident and is for 1 year in the first instance. Salary in accordance with the scale laid down by the Ministry of Health for Registrars.

Application forms may be obtained from the Secretary to the Board of Governors, Royal Free Hospital, Gray's Inn-road, W.C.1, to whom they should be returned not later than 12th April, 1955.

ROYAL FREE HOSPITAL, London, W.C.1. Applications from registered medical practitioners (Men or Women) are invited for the post of Whole-time NON-RESIDENT REGISTRAR in Clinical Pathology. Appointment for 1 year in the first instance, from 1st September, 1955. Some experience in clinical pathology is essential.

Applications should be sent to the Secretary to the Board of Governors at the above address, not later than Monday, 2nd May, 1955.

ROYAL FREE HOSPITAL GROUP. Applications are invited for the appointment of REGISTRAR (Woman) to the Gynæcological and Obstetric Department of the Elizabeth Garrett Anderson Hospital, with some duties at the Hampstead General Hospital. Applicants must be registered medical practitioners of not more than 10 years qualification. The appointment is full-time, resident, for 1 year in the first instance, duties to commence 1st June, 1955. Salary and conditions of service in accordance with those laid down by the Ministry of Health.

Applications, with the names of 3 referees, to be sent to the Secretary to the Board of Governors, Royal Free Hospital, Gray's Inn-road, London, W.C.1, not later than 7th April, 1955.

ROYAL MARSDEN HOSPITAL, Fulham-road, London, S.W.3. Applications are invited from registered medical practitioners for the 2 posts of HOUSE SURGEON (resident). Salary £525 p.a. The posts are tenable for 6 months from 18th May.

Forms of application are obtainable from the House Governor, to whom applications, together with copies of 3 recent testimonials, should be sent not later than Monday, 11th April.

ROYAL NATIONAL ORTHOPÆDIC HOSPITAL, BROCKLEY HILL, STANMORE, MIDDLESEX. Applications are invited for the posts of RESIDENT SENIOR HOUSE OFFICERS (2 vacancies), for a period of 6 months. 1 to commence duties on 16th June and 1 on 9th July.

Applications to be received by 9th April. Forms of application can be obtained from the House Governor at 234, Great Portland-street, London, W.1.

ROYAL NATIONAL ORTHOPÆDIC HOSPITAL, 234, Great Portland-street, London, W.1. Applications are invited for the appointment of RESIDENT SENIOR HOUSE OFFICER for a period of 6 months; duties to commence 9th June, 1955.

Applications to be received not later than 9th April, 1955. Forms of application can be obtained from the House Governor at 234, Great Portland-street, London, W.1.

ROYAL NATIONAL ORTHOPÆDIC HOSPITAL, 234, Great Portland-street, London, W.1. Applications are invited for the appointment of CLINICAL ASSISTANT (whole-time). The post is graded as Senior House Officer status and will include assisting in outpatient and inpatient work. The work is that of a Junior Registrar and provides wide experience in orthopædics. The appointment to commence 1st July.

Applications to be received by 9th April. Forms of application can be obtained from the House Governor, 234, Great Portland-street, London, W.1.

ST. GEORGE-IN-THE-EAST HOSPITAL, Raine-street, Wapping, E.1. Applications are invited for the post of HOUSE PHYSICIAN (pre- or post-registration). Post vacant 8th April, 1955. Tenable for 6 months. Salary, &c., in accordance with national scale.

Applications, stating age, nationality, qualifications and experience, together with copies of 3 recent testimonials, to be sent to the Medical Superintendent.

ST. BARTHOLOMEW'S HOSPITAL, E.C.1. Applications are invited for the post of REGISTRAR in the Dental Department. Duties include every branch of dental and oral surgery, including orthodontics and prosthetics. Applicants should if possible hold a higher dental qualification, or else a medical qualification in addition to a dental one. The appointment is for 2 years, subject to annual re-election, and the remuneration will be in accordance with the Ministry of Health scale for Registrars.

Applications, with names of 3 referees, should be submitted to the undersigned within 14 days from the appearance of this advertisement.

C. C. CARUS-WILSON, Clerk to the Governors.

ST. JAMES' HOSPITAL, Balham, S.W.12. House Physi-CIAN (pædiatric). Post recognised for D.C.H.

Applications, stating age, qualifications, experience, and names of 2 referees, to Group Secretary, Wandsworth Hospital Group, at above address by 7th April.

ST. MARY'S HOSPITAL, W.2. Applications are invited from suitably qualified candidates for the post of Whole-time SENIOR REGISTRAR in the Venereal Diseases Department. The appointment is for a first period of 12 months as from 8th May, 1955, the holder being eligible for re-election.

Applications, stating nationality, date of birth, qualifications, dates, details and National Health Service gradings of previous and present appointments, together with the names and addresses of 3 referees, should reach ALAN POWDITCH, House Governor, not later than 6th April, 1955.

ST. MARY'S HOSPITAL, W.2. Applications are invited for the post of Whole-time REGISTRAR in the Venereal Diseases Department. The appointment is for a period of 12 months as from a date to be arranged, the holder being eligible for re-election.

Applications, stating nationality, date of birth, qualifications, dates, details and National Health Service gradings of previous and present appointments, together with the names and addresses of 3 referees, should reach ALAN POWDITCH, House Governor, not later than 6th April, 1955.

ST. MARY'S HOSPITAL, W.2. Applications are invited from suitably qualified practitioners for the post of non-resident Whole-time REGISTRAR in General Medicine. The successful candidate will be required to undertake work in the Casualty and Outpatient Departments as well as having certain inpatient duties. The appointment will be for a first period of 12 months with effect from 30th May, 1955.

Applications, stating nationality, date of birth, permanent address, qualifications with dates, details and National Health Service gradings of previous and present appointments, together with the names and address of 3 referees, should reach ALAN POWDITCH, House Governor, not later than 6th April, 1955.

ST. MARY'S HOSPITAL, Paddington, W.2. Applications are invited for the post of Part-time REGISTRAR to the Psychiatric Department (5 notional half-days). Previous experience in psychiatry is necessary; preference will be given to candidates holding the D.P.M. The appointment will be for a first period of 12 months, as from 1st June, 1955; remuneration at Registrar rates.

Applications, stating nationality, date of birth, permanent address, qualifications, dates, details and National Health Service gradings of previous and present appointments, together with the names and addresses of 3 referees, should reach ALAN POWDITCH, House Governor, not later than 14th April, 1955.

ST. MARY'S HOSPITAL, W.2. Applications are invited for the post of NON-RESIDENT CASUALTY SURGICAL OFFICER, graded Registrar; the F.R.C.S. qualification is desirable. The appointment is for a first period of 12 months, as from 1st June, 1955, the holder normally being eligible for re-election. The successful candidate will be required to work half-time in the Casualty Department and half-time on the Orthopædic Firm.

Applications, stating nationality, date of birth, permanent address, qualifications, with dates, details, and National Health Service gradings of previous and present appointments, together with the names and addresses of 3 referees, should reach ALAN POWDITCH, House Governor, not later than 14th April, 1955.

ST. PETER'S, ST. PAUL'S AND ST. PHILIP'S HOS-PITALS. A vacancy will occur on 1st July, 1955, for the post of RESIDENT SURGICAL OFFICER at St. Philip's Hospital. Grading, Registrar first year. Appointment for 6 months with opportunity for extension.

Apply in writing (12 copies) and names of 2 referees, to the House Governor, St. Peter's Hospital, Henrietta-street, W.C.2. Closing date 30th April, 1955.

SOUTH LODGE HOSPITAL, World's End-lane, N.21. ENFIELD GROUP HOSPITAL MANAGEMENT COMMITTEE. HOUSE OFFICER (first, second, or third post—not pre-registration), resident. General duties mainly surgical and E.N.T., as directed by the Medical Superintendent. National Health Service salary plus £50 p.a. Vacant 1st May, 1955.

Applications, with the names and addresses of 2 referees, to the Group Secretary, Chase Farm Hospital, The Ridgeway, Enfield, Middlesex.

TAVISTOCK CLINIC, 2-4, Beaumont-street, London, W.1. SENIOR PSYCHIATRIC REGISTRAR, Department for Children and Parents, at above Clinic. Post vacant 1st September, 1955. At least 1 years experience in child psychiatry essential. Clinic may be visited by direct appointment.

Application forms obtainable from, and returnable to, Group Secretary, Central Middlesex Group Hospital Management Committee, Acton-lane, London, N.W.10, by 6th April, 1955.

THE HOSPITAL FOR SICK CHILDREN, Great Ormond-street, London, W.C.1. There is a vacancy for a Whole-time ASSISTANT MEDICAL REGISTRAR (Registrar grade).

Further particulars and form of application, which must be returned not later than Monday, 11th April, 1955, may be obtained from the undersigned.

H. F. RUTHERFORD, House Governor and Secretary.

THE HOSPITAL FOR SICK CHILDREN, Great Ormond-street, London, W.C.1. There will be vacancies for the following Senior House Officers on 15th July, 1955 :—

2 HOUSE PHYSICIANS.
2 HOUSE SURGEONS

Further particulars and form of application, which must be returned not later than 2nd May, 1955, are obtainable from the undersigned.

H. F. RUTHERFORD, House Governor and Secretary.

ABERDEEN MATERNITY HOSPITAL. Applications are invited for the post of SENIOR HOUSE OFFICER in Obstetrics. The appointment is tenable for 1 year. Rotation inside the Unit of Obstetrics and Gynæcology is arranged to meet the needs of training.

Applications, stating age, qualifications and experience, together with the names of 2 referees, should be sent to the Group Medical Superintendent, Royal Aberdeen Hospital for Sick Children, Westburn-drive, Aberdeen, within 10 days of appearance of this advertisement.

ASHINGTON HOSPITAL, Ashington, Northumberland. (55 Beds.) Applications are invited for the appointment of RESIDENT SURGICAL OFFICER (Junior Hospital Medical Officer grade) at the above Hospital. Salary within the scale of £775–£50–£1075 p.a., in accordance with and subject to the agreed terms and conditions of service. The appointment will be for a period of 1 year, subject to yearly renewal for a period of up to 4 years. The post becomes vacant on 1st May.

Applications, giving full particulars of past and present appointments, qualifications and the names of 3 referees, should be sent as early as possible to the Secretary, Wansbeck Hospital Management Committee, Thomas Knight Memorial Hospital, Blyth.

BEDFORD GENERAL HOSPITAL. (437 Beds.) Locum RESIDENT CASUALTY OFFICER (Registrar grade) required 1st May, pending permanent appointment. Salary £17 10s. per week.

Applications, stating age, nationality, qualifications, previous appointments, together with copies of 2 recent testimonials, should be forwarded to Group Secretary, Bedford Group Hospital Management Committee, 3, Kimbolton-road, Bedford, by not later than 7th April.

BIRMINGHAM ACCIDENT HOSPITAL, Bath-row, BIRMINGHAM, 15. SENIOR HOUSE OFFICER (pathology). Previous experience essential. Higher qualification desirable. Experience available in haematology, including blood transfusion, bacteriology, biochemistry and morbid anatomy.

Apply Pathologist.

BIRMINGHAM AND MIDLAND EAR AND THROAT HOSPITAL, Edmund-street, BIRMINGHAM, 3. Required, SENIOR HOUSE OFFICER or HOUSE OFFICER (including pre-registration), according to experience.

Detailed applications, with copies of 2 recent testimonials, to the Secretary, Dudley Road Hospital, Birmingham, 18.

BIRMINGHAM, 18. DUDLEY ROAD HOSPITAL. HOUSE SURGEON (pre-registration) required 1st May, 1955. Recognised for F.R.C.S. 1 of 3 surgical units of approximately 85 general beds under 2 Consultant Surgeons.

Applications, with copies of 2 recent testimonials, to Secretary.

BIRMINGHAM. HIGHCROFT HALL HOSPITAL, ERDINGTON, BIRMINGHAM, 23. JUNIOR HOSPITAL MEDICAL OFFICER. This Mental Hospital (1227 Beds) provides opportunities for experience and training in all branches of psychiatry, and is recognised as a training centre for the D.P.M. Previous experience not essential. Single residential accommodation is available, but Officers who so desire may live outside the Hospital.

Applications, giving personal particulars and qualifications, should be submitted to the Medical Superintendent within 14 days.

BIRMINGHAM REGIONAL HOSPITAL BOARD.

(1) **Birmingham (Selly Oak) Hospital Management Committee, Oak Tree-lane, Birmingham, 29**

Whole-time REGISTRAR, E.N.T. Department (39 Beds) for Selly Oak Hospital, Birmingham, 29 (1090 Beds). Non-resident. Experience specialty and higher qualification an advantage.

(2) **No. 20 Group : Hospital Management Committee, Coventry and Warwickshire Hospital, Stoney Stanton-road, Coventry**

(*a*) REGISTRAR in General Medicine for Coventry and Warwickshire Hospital (354 Beds). Resident. Experience specialty essential.

(*b*) REGISTRAR in General Surgery. Duties mainly at Coventry and Warwickshire Hospital (354 Beds). Recognised for F.R.C.S. Experience specialty essential. Higher qualification desirable. Resident.

(3) **South Worcestershire Hospital Management Committee, Worcester Royal Infirmary, Worcester**

REGISTRAR in Obstetrics and Gynæcology for Worcester Royal Infirmary/Ronkswood Hospital. 50 obstetrical and 26 gynæcological beds in modern and busy department. Experience in specialty required. Single/married quarters available.

(4) **West Bromwich and District Hospitals Group (No. 18), West Bromwich and District General Hospital, Edward-street, West Bromwich**

Whole-time REGISTRAR in General Surgery for Hallam Hospital, West Bromwich (456 Beds). Recognised for the F.R.C.S. Resident. The post offers wide experience in surgical practice.

(5) **Wolverhampton Group No. 16 Hospital Management Committee, The Royal Hospital, Wolverhampton**

RESIDENT SURGICAL REGISTRAR for New Cross Hospital (636 Beds) preferably F.R.C.S.

Application forms from Group Secretaries to be returned before 11th April, 1955. Candidates may visit Hospitals.

BIRMINGHAM REGIONAL HOSPITAL BOARD. Wolverhampton group. SENIOR REGISTRAR in General Medicine (whole-time). Duties mainly at Royal Hospital, Wolverhampton (279 Beds). Experience specialty/higher qualifications essential. Successful candidate may be required to spend not more than 2 years in a selected hospital of the United Birmingham Hospitals in accordance with arrangements for interchange of Senior Registrars agreed between the 2 Boards.

Application forms from Secretary, Regional Hospital Board, 10, Augustus-road, Birmingham, 15, before 11th April, 1955.

BIRMINGHAM (SANATORIA) GROUP HOSPITAL MANAGEMENT COMMITTEE. Applications are invited for the post of JUNIOR HOSPITAL MEDICAL OFFICER at West Heath Hospital, Rednal-road, Birmingham, 31 (210 Beds). The successful applicant will reside at the above Hospital (accommodation for single person only), and will be required to undertake duties at the Birmingham Chest Clinic, Great Charles-street, Birmingham, 3.

Applications, stating age, qualifications, training, and experience, together with copies of 3 recent testimonials, should be addressed to the Secretary, Birmingham (Sanatoria) Group Hospital Management Committee, Yardley Green Hospital, Birmingham, 9, as soon as possible.

BIRMINGHAM. THE UNITED BIRMINGHAM HOSPITALS. THE BIRMINGHAM AND MIDLAND HOSPITALS FOR WOMEN (Incorporating the Hospital for Women and the Birmingham Maternity Hospital), Showell Green-lane, SPARKHILL, BIRMINGHAM, 11. Applications are invited for the post of RESIDENT OBSTETRICAL AND GYNÆCOLOGICAL REGISTRAR vacant 1st July, 1955. The successful candidate will be required to alternate duty at the Hospital for Women and the Maternity Hospital, for specified periods. The post is recognised for the M.R.C.O.G., and applicants should have held House appointments and at least 1 obstetrical and gynæcological post.

Forms of application may be obtained from, and should be returned not later than 18th April, 1955, to, the House Governor at the above address. G. A. PHALP, Secretary.

BIRMINGHAM. THE UNITED BIRMINGHAM HOSPITALS. THE CHILDREN'S HOSPITAL, Ladywood-road, BIRMINGHAM, 16. Applications are invited for the appointment of RESIDENT SENIOR HOUSE OFFICER (clinical pathology), vacant on 1st May, 1955, for 1 year. Applicants should have held resident appointments in a children's hospital or a children's department of a general hospital. The successful candidate will be required to work in the Clinical Pathological Department.

Forms of application may be obtained from the House Governor and should be returned by 15th April, 1955.

G. A. PHALP, Secretary to the Board of Governors.

BISHOP AUCKLAND GENERAL HOSPITAL. (350 Beds.) SOUTH WEST DURHAM HOSPITAL MANAGEMENT COMMITTEE. RESIDENT ANÆSTHETIST (Senior House Officer) required.

Apply, naming 2 referees, to—

K. G. T. LUXFORD, Group Secretary/Finance Officer.
The General Hospital, Bishop Auckland, co. Durham.

BISHOP'S STORTFORD, HERTFORDSHIRE. HAYMEADS HOSPITAL. Applications are invited from registered practitioners for the post of HOUSE OFFICER (obstetrics), Male or Female, first, second, or third post held, to commence 1st May, 1955, for period of 6 months. Duties in connection with Obstetric Department, Neonatal Nursery and Pædiatric Ward of 24 Beds. Salary £425–£525 p.a., less £125 in respect of resident facilities.

Applications, stating nationality, age, qualifications and experience, with copies of recent testimonials or names of referees, to Hospital Secretary as soon as possible.

BOLTON AND DISTRICT HOSPITAL MANAGEMENT COMMITTEE.

Bolton District General Hospital (Townleys Branch, Psychiatric Unit)

SENIOR HOUSE OFFICER in Psychiatry (resident). Unit is attached to a General Hospital. Consultant Psychiatrist in charge. All forms of modern treatment in use. Post offers excellent facilities for anyone desiring to specialise in psychiatry and attend the D.P.M. course at Manchester University. Hospital also recognised for London and Irish D.P.M. Outpatient clinics in existence. Post vacant early April and tenable for 12 months.

Bolton District General Hospital (604 Beds)

RESIDENT HOUSE PHYSICIAN for the Department of Pædiatrics. Not available to pre-registration candidates. Vacant 25th April, tenable for 6 months. Hospital recognised for D.C.H.

Applications, stating age, nationality, qualifications, experience and the names of 2 referees, to Group Secretary, The Royal Infirmary, Bolton.

BOLTON AND DISTRICT HOSPITAL MANAGEMENT COMMITTEE. MEDICAL OFFICER required for duties in the Geriatric Department (which contains acute admission wards and has full physiotherapy, laboratory and radiological facilities) and also to assist in the supervision of the health of nurses. Salary scale £775–£1075.

Applications, stating age, nationality, qualifications, experience, and the names of 2 referees to Group Secretary, The Royal Infirmary, Bolton.

BOURNEMOUTH AND EAST DORSET HOSPITAL MANAGEMENT COMMITTEE. Applications are invited for the appointment of REGISTRAR in Orthopædic Surgery at the Royal Victoria Hospital, Boscombe, Bournemouth, consisting of 494 Beds which includes 64 orthopædic beds. There is a large Outpatient Department covering both traumatic and non-traumatic orthopædics in all branches, in children and adults. The post is non-resident and is tenable for 2 years in the first instance.

Forms of application obtainable from the Group Secretary, Hospital Management Committee Office, Royal Victoria Hospital, Gloucester-road, Boscombe, should be returned to him, duly completed, within 8 days of the appearance of this advertisement.

BRIGHTON AND LEWES HOSPITAL MANAGEMENT COMMITTEE GROUP HOSPITALS. (78 Beds.) SENIOR HOUSE OFFICER for duties in the E.N.T. Department of the above Group. Recognised for F.R.C.S. and D.L.O.

Applications, with details of experience, &c., together with the names of 2 referees, to the Administrative Officer, Royal Sussex County Hospital, Brighton, 7.

BRIGHTON. SUSSEX EYE HOSPITAL, Eastern-road, BRIGHTON, 7. (56 Beds.) SENIOR HOUSE SURGEON (Senior House Officer) and HOUSE SURGEON (House Officer) required mid-April. Posts recognised for F.R.C.S. under 23 (b).

Applications, stating age, qualifications and experience, together with the names of 2 referees, to the Administrative Officer.

BRISTOL. SOUTHMEAD GENERAL HOSPITAL GROUP MANAGEMENT COMMITTEE. Required at Southmead Hospital (571 Beds, including 133 maternity) RESIDENT SENIOR HOUSE OFFICER (medical) for 12 months commencing 1st May, 1955.

Applications to be forwarded to the undersigned forthwith.

C. C. HANCOCK, Group Secretary.

Southmead Hospital, Bristol.

BRISTOL. UNITED BRISTOL HOSPITALS. (Joint appointment with the South-Western Regional Hospital Board.) Applications are invited by the above Boards from registered medical practitioners for the post of SENIOR REGISTRAR in the Genito-urinary Department. The successful applicant will be appointed to work, in the first instance for 1 year, in the United Bristol Hospitals and Southmead General Hospital.

Applications, stating age, qualifications and experience, and giving the names of 2 referees, should be sent not later than 7th April, 1955, to Secretary to the Board, Royal Infirmary Branch, Bristol, 2.

BRISTOL. WINFORD ORTHOPÆDIC HOSPITAL. (230 Beds.) Applications are invited from registered medical practitioners for post of SENIOR HOUSE OFFICER which is suitable for candidate reading for a higher grade qualification and is recognised for F.R.C.S. Hospital is staffed by Consultants of teaching hospital.

Apply, stating age, qualifications and experience, with testimonials, to Secretary.

BROXBURN, WEST LOTHIAN. BANGOUR GENERAL HOSPITAL. PLASTIC SURGERY AND JAW INJURIES UNIT. Applications are invited for an appointment as HOUSE OFFICER in the Plastic Surgery and Jaw Injuries Unit of Bangour General Hospital, Broxburn, which is 15 miles from Edinburgh. Salary and conditions of service will be in accordance with the regulations.

Applications, giving age, qualifications, and particulars of previous experience, if any, should be lodged with the Group Medical Superintendent, Bangour General Hospital, Broxburn, West Lothian.

BROXBURN, WEST LOTHIAN. BANGOUR GENERAL HOSPITAL. CHEST AND TUBERCULOSIS UNIT. Applications are invited for the appointment of a HOUSE OFFICER in the Chest and Tuberculosis Unit at Bangour General Hospital, Broxburn (650 Beds), which is 15 miles west of Edinburgh. This Unit (300 Beds) offers comprehensive experience in latest methods of treatment of tuberculosis. Thoracic, orthopædic, and genito-urinary surgery are done within the Unit which is also the centre of area domiciliary and outpatient work.

Applications, giving age, qualifications, and particulars of previous experience, to the Group Medical Superintendent, Bangour General Hospital, Broxburn, West Lothian.

BURTON GENERAL HOSPITAL, Burton-on-Trent. Applications are invited for the post of HOUSE OFFICER at the above Hospital, to commence on 1st May, 1955, firstly as House Surgeon (general) and subsequently as House Surgeon (gynæcology and obstetrics); both pre-registration appointments. Hospital recognised for F.R.C.S.

Apply Group Secretary.

CAERPHILLY DISTRICT HOSPITAL, near Cardiff. (175 Beds for acute medicine and surgery.) HOUSE SURGEON (pre-registration appointment) required at above Hospital. Married quarters available.

Apply to the Group Secretary, Rhymney and Sirhowy Valleys Hospital Management Committee.

CAERPHILLY DISTRICT MINERS' HOSPITAL. Applications are invited from registered medical practitioners for appointments of CLINICAL ASSISTANT/ANÆSTHETIST on the staff of above Hospital.

Particulars obtainable from the Secretary, Rhymney and Sirhowy Valleys Hospital Management Committee, St. Martin's-road, Caerphilly, Glam.

CANTERBURY. KENT AND CANTERBURY HOSPITAL. (276 Beds.) The post of GENERAL SURGICAL AND UROLOGICAL HOUSE SURGEON (pre-registration, first, second, or third post), which is recognised for the F.R.C.S., becomes vacant in early April, 1955. National Health Service salary and conditions.

Applications, together with copies of 2 recent testimonials, to be addressed to the Hospital Secretary at the above Hospital.

CANTERBURY. KENT AND CANTERBURY HOSPITAL. (276 Beds.) Applications are invited for the post of SENIOR HOUSE OFFICER (casualty) which is now vacant. Salary £745 p.a. Recognised for the F.R.C.S.

Applications to be sent to the Hospital Secretary at the above Hospital, together with copies of 3 recent testimonials.

CARSHALTON, SURREY. QUEEN MARY'S HOSPITAL FOR CHILDREN. (Acute Children's Hospital of 840 Beds.) HOUSE SURGEON (resident) required for 6 months. Applicants must have completed 12 months Pre-registration Service. Position vacant mid-May.

Applications, stating age, qualifications and experience, together with 3 recent testimonials, should be sent to the Group Secretary by 31st March, 1955.

CARSHALTON, SURREY. QUEEN MARY'S HOSPITAL FOR CHILDREN. (Acute Children's Hospital of 840 Beds.) HOUSE PHYSICIAN (Senior House Officer). Care of acute medical, rheumatism and poliomyelitis beds. Position vacant end of May.

Applications, stating age, qualifications and experience, with copies of 3 testimonials, should reach the Secretary by 31st March, 1955.

CARDIFF ISOLATION HOSPITAL. Cardiff Hospital MANAGEMENT COMMITTEE. SENIOR HOUSE OFFICER (resident) required at above Hospital.

Apply immediately to Group Secretary, 44, Cathedral-road, Cardiff.

CARDIFF. THE UNITED CARDIFF HOSPITALS and THE WELSH REGIONAL HOSPITAL BOARD. Applications are invited for the joint appointment of a SENIOR SURGICAL REGISTRAR. The successful candidate will spend the first 2 years of his appointment in the United Cardiff Hospitals and the second 2 years in Regional Board Hospitals.

Application forms, which can be obtained from Secretary, United Cardiff Hospitals, Cardiff Royal Infirmary, Cardiff, should be returned within 14 days from the appearance of this advertisement.

CARDIFF. THE UNITED CARDIFF HOSPITALS. Applications are invited for the post of SENIOR HOUSE OFFICER in Surgery at Llandough Hospital.

Application forms obtainable from the Secretary, United Cardiff Hospitals, Cardiff Royal Infirmary.

CHELMSFORD AND ESSEX HOSPITAL. Applications are invited for the resident post of CASUALTY OFFICER (Senior House Officer). It is recognised for the F.R.C.S. and offers excellent experience in the treatment of fractures and diagnosis of acute medical and surgical emergencies. Opportunity is given for Casualty Officer to follow up his cases in the wards and to obtain operating experience in major theatre under the guidance of the Consultants or the Resident Surgical Officer. Off duty time is generous and the post is one likely to suit both an officer seeking a higher qualification in surgery or one intending General Practice. The vacancy will occur on 1st April. Salary £745 p.a., with £130 deducted for residential emoluments.

Apply Secretary, Chelmsford Hospital Management Committee, Chelmsford and Essex Hospital, Chelmsford.

CHELMSFORD AND ESSEX HOSPITAL. (162 Beds.) Applications are invited for the post of RESIDENT HOUSE SURGEON (pre-registration post). The post will become vacant on 16th April, and offers good surgical experience and is recognised for the F.R.C.S.

Applications, together with 2 recent testimonials, to the Secretary, Chelmsford Hospital Management Committee, London-road, Chelmsford.

CHELTENHAM GENERAL AND EYE HOSPITAL. (170 Beds.) HOUSE SURGEON (pre-registration or otherwise) required.

Applications, together with the names of 2 referees, to be sent to the Group Secretary, General Hospital, Cheltenham.

CHERTSEY, SURREY: ST. PETER'S HOSPITAL (late Botleys Park War Hospital). (430 Beds.) ORTHOPÆDIC HOUSE SURGEON required from 23rd April. Senior House Officer or House Officer (Intern) grade. Post recognised for F.R.C.S. or for pre-registration internship. Preference will be given to provisionally registered candidates. Salary in accordance with terms and conditions of National Health Service.

Applications, together with names and addresses of referees, to be sent to the Physician-Superintendent as soon as possible.

COLCHESTER (near). BRITISH LEGION SANATORIUM, NAYLAND, COLCHESTER, ESSEX. (207 Beds for treatment of early pulmonary tuberculosis in women.) IPSWICH GROUP HOSPITAL MANAGEMENT COMMITTEE. Applications invited for the appointment of SENIOR HOUSE OFFICER. No married quarters available. Deduction for residential emoluments £150 p.a.

Applications, with 2 testimonials, to the Physician-Superintendent.

COLCHESTER HOSPITAL MANAGEMENT COMMITTEE. Applications are invited for the following posts:—

Essex County Hospital, Colchester (188 Beds)

SENIOR HOUSE OFFICER (Casualty and Radiotherapy Departments).

SENIOR HOUSE OFFICER (Casualty and E.N.T. Departments).

Posts tenable for 6 months or 1 year. Recognised for F.R.C.S.

Clacton and District Hospital, Clacton-on-Sea (58 Beds)

SENIOR HOUSE OFFICER (Resident Surgical Officer).

Post tenable for 1 year.

Applications, with copies of 3 testimonials, to the Group Secretary, 14, Pope's-lane, Colchester, Essex.

DERBY. CITY HOSPITAL. House Surgeon (pre-registration) or SENIOR HOUSE OFFICER (surgical). The post is recognised for the F.R.C.S. Vacant on 27th April.

Applications, stating full details, together with copies of 2 recent testimonials, to Medical Superintendent.

DERBY. DERBYSHIRE ROYAL INFIRMARY. (396 Beds.) SHEFFIELD REGIONAL HOSPITAL BOARD. Whole-time NON-RESIDENT REGISTRAR (dermatology) required. Appointment for 1 year in first instance.

Apply to Secretary, Sheffield Regional Hospital Board, Old Fulwood-road, Sheffield, by 4th April, 1955, giving age, nationality, qualifications, present and previous appointments with dates, naming 3 referees.

DORKING GENERAL HOSPITAL, Horsham-road, DORKING. SENIOR HOUSE OFFICER (general surgery, orthopædics, and E.N.T.), vacant end April, 1955.

Apply, with 2 copy testimonials, to the Medical Superintendent.

DONCASTER ROYAL INFIRMARY. (330 Beds.) DONCASTER HOSPITAL MANAGEMENT COMMITTEE. Applications are invited for the post of RESIDENT ANÆSTHETIST in the grade of Senior House Officer.

Applications to the Secretary to the Committee at Doncaster Royal Infirmary.

DRIFFIELD, YORKSHIRE. NORTHFIELD SANATORIUM. (78 Beds.) SENIOR HOUSE PHYSICIAN, vacant now. Offers experience all branches of tuberculosis within Group, including surgery, M.M.R., and clinics. Time for study. Ex-patients welcome. £165 for full residence.

Applications to Group Secretary, Westwood Hospital, Beverley, Yorkshire.

DUDLEY, STOURBRIDGE AND DISTRICT HOSPITAL GROUP, BIRMINGHAM REGION.

The Guest Hospital, Dudley (154 Beds)

SENIOR HOUSE OFFICER (casualty).

Wordsley Hospital, near Stourbridge (478 Beds)

SENIOR HOUSE OFFICER (anæsthetics). Resident. Previous experience house appointments essential. Experience available general surgery, gynæcology, orthopædics, plastic surgery unit.

SENIOR HOUSE OFFICER (surgical).

Applications, stating age, experience, with copies of 3 recent testimonials, to Group Secretary, The Guest Hospital, Dudley, Worcs.

DURHAM. COUNTY HOSPITAL. (116 Beds.) House SURGEON in Orthopædics and Casualty required. This post is recognised for pre-registration purposes and is vacant now. The County Hospital is the main Orthopædic and Accident Hospital in a busy mining and industrial area. Experience can be obtained in all branches of orthopædics.

Applications, with particulars of previous experience, and names of 2 referees, to Group Secretary, Dryburn Hospital, Durham.

DURHAM. DRYBURN HOSPITAL. (309 Beds.) Applications are invited from fully registered medical practitioners for the post of HOUSE OFFICER in General Medicine at Dryburn Hospital. Post vacant now. This post will provide good experience in the treatment of acute and chronic medical cases.

Applications, with particulars of previous experience and names of 2 referees, to Group Secretary, Dryburn Hospital, Durham.

EAST ANGLIAN REGIONAL HOSPITAL BOARD.

(1) SURGICAL REGISTRAR (resident), North Cambridgeshire Hospital, Wisbech. Post provides good training and experience in both general and orthopædic surgery. Appointment for 1 year, renewable for second year.

(2) SURGICAL REGISTRAR, East Suffolk and Ipswich Hospital. Post recognised for F.R.C.S. Appointment for 1 year, renewable for second year.

Applications, stating age, experience and the names of 3 referees, to Secretary of Board, 117, Chesterton-road, Cambridge, by 4th April, 1955. Candidates invited to visit hospital by direct arrangement with Hospital Management Committee Secretary at the hospital.

ELLESMERE PORT HOSPITAL. Applications are invited for the post of RESIDENT SURGICAL OFFICER (Junior Hospital Medical Officer). Accommodation suitable for a married practitioner is available at a reasonable rental.

Applications, giving full details together with the names and addresses of 2 referees, should be forwarded to the Group Secretary, XIII Chester and District Hospital Management Committee, 5, King's-buildings, Chester.

ENFIELD, MIDDLESEX. CHASE FARM HOSPITAL. ENFIELD GROUP HOSPITAL MANAGEMENT COMMITTEE. Appointment of RESIDENT HOUSE PHYSICIAN (third post), vacant 8th May, 1955. General medical duties. 6 months appointment.

Applications, with the names of 2 referees, to the Secretary, Enfield Group Hospital Management Committee.

EPSOM, SURREY. ST. EBBA'S HOSPITAL. St. Ebba's AND BELMONT GROUP HOSPITAL MANAGEMENT COMMITTEE. SOUTH WEST METROPOLITAN REGIONAL HOSPITAL BOARD. Applications are invited for the appointment of REGISTRAR at above Hospital. The Hospital (865 Beds) is principally concerned with the treatment of voluntary cases of good prognosis and has over 1300 admissions annually. There are full facilities for psychological and physical investigations and all modern treatment methods are used. The Hospital has Outpatient Departments and a special unit for juvenile psychiatric cases. Tutorials are given by senior staff in preparation for the D.P.M. and arrangements can be made to attend London neurological clinics. Full residential amenities are available. Candidates may visit the Hospital by appointment with the Physician-Superintendent.

Application forms may be obtained from the Group Secretary, St. Ebba's and Belmont Group Hospital Management Committee, Group Office, Belmont Hospital, Brighton-road, Sutton, Surrey, and completed forms should be returned to him within 2 weeks of the appearance of this advertisement.

EPSOM, SURREY. WEST PARK HOSPITAL (for all stages of nervous and mental disorders). SOUTH WEST METROPOLITAN REGIONAL HOSPITAL BOARD. Applications are invited for 2 appointments of REGISTRAR in Psychiatry at above Hospital. Candidates may be of either sex. Single residential quarters are available.

Applications (5 copies) should be made on forms to be obtained from the Secretary to the Hospital Management Committee at the Hospital, to whom they should be returned within 10 days.

GRIMSBY GENERAL HOSPITAL. Grimsby Hospital MANAGEMENT COMMITTEE. Applications are invited for the post now vacant, of SENIOR HOUSE OFFICER (orthopædic). Locum would be considered.

Applications, with names and addresses of 2 referees, to Hospital Secretary, Grimsby General Hospital.

GRIMSBY GENERAL HOSPITAL. Grimsby Hospital MANAGEMENT COMMITTEE. SENIOR HOUSE OFFICER for casualty duties required 8th April, 1955. Resident post. Recognised by Royal College of Surgeons for Final Fellowship examination. Hours: 9 A.M.–6 P.M. Monday–Friday; 9 A.M.–12 P.M. Saturday. The Hospital possesses a well-equipped medical library.

Applications, with names and addresses of 2 referees, to the Hospital Secretary, Grimsby General Hospital.

GAINSBOROUGH. JOHN COUPLAND HOSPITAL. (40 Beds.) LINCOLN NO. 1 HOSPITAL MANAGEMENT COMMITTEE. Applications are invited for the post of RESIDENT MEDICAL OFFICER at the above Hospital. The Hospital has a number of both medical and surgical beds. Salary is in accordance with Junior Hospital Medical Officer grade of the terms laid down for hospital medical and dental staffs. Married quarters are available.

Applications, giving full particulars, should be forwarded as soon as possible to R. W. HOWICK, Group Secretary, County Hospital, Lincoln.

GUILDFORD ROYAL SURREY COUNTY HOSPITAL. (232 Beds,) RESIDENT HOUSE SURGEON required for general surgery. Post is vacant from 18th April and tenable for 6 months. It is approved for pre-registration practitioners and recognised for the F.R.C.S. examination.

Applications, with copies of 3 testimonials, should be sent to the Hospital Secretary as soon as possible.

FARNBOROUGH HOSPITAL, Farnborough, Kent. (800 Beds.) ORTHOPÆDIC SENIOR HOUSE OFFICER required for 1 year. Deduction for residence £150.

Apply, stating age, qualifications with dates, experience, and naming 3 referees, to the Administrative Officer.

HALIFAX GENERAL HOSPITAL. (425 Beds.) Senior HOUSE OFFICER in Obstetrics and Gynæcology required at the above Hospital which has 86 obstetric and 40 gynæcological beds. The post, which will become vacant in May, is recognised for the M.R.C.O.G. in Obstetrics and Gynæcology. Charge for board-residence, &c., £130 p.a.

Applications to be forwarded to the Group Secretary, Royal Halifax Infirmary, Halifax.

HALIFAX GENERAL HOSPITAL. (425 Beds.) Junior HOSPITAL MEDICAL OFFICER in Anæsthetics required. Board-residence available.

Applications to Group Secretary, Royal Halifax Infirmary, Halifax.

HERTFORD COUNTY HOSPITAL. (171 Beds. Hospital situated 21 miles from London.) RESIDENT CASUALTY OFFICER (Senior House Officer grade) with attachment to Pædiatrician and Ophthalmic Consultant. Salary £745 p.a., less £130 p.a. residential emoluments. Recognised under F.R.C.S. regulations. Appointment to commence 1st May, 1955.

Apply, with full details and references, to Group Secretary, Hertford Hospital Management Committee, County Hospital, Hertford, Herts.

HERTFORD COUNTY HOSPITAL. (Situated 21 miles from London.) Applications are invited from registered medical practitioners for the appointment of a Whole-time Locum REGISTRAR (surgical). To commence as soon as possible for approximately 1–2 months. Salary £17 10s. per week.

Applications, giving full details, together with copies of recent testimonials or the names of referees, to Group Secretary, Hertford Hospital Management Committee, County Hospital Hertford, Herts.

HILLINGDON HOSPITAL, Uxbridge, Middlesex. (General—705 Beds.) HOUSE SURGEON (general and thoracic surgery) required at above Hospital. Pre-registration House Officers may also apply.

Applications, together with copies of not more than 3 recent testimonials, to Medical Director by 4th April.

HITCHIN, HERTFORDSHIRE. NORTH HERTS HOSPITAL. Applications are invited for the post of SENIOR HOUSE OFFICER in Obstetrics and Gynæcology (42 obstetric beds and 20 gynæcological beds). The appointment is for 1 year from 1st May, 1955, and is recognised for the D.Obst.R.C.O.G. Some experience in obstetrics is an advantage but not essential.

Applications, stating age, qualifications and experience, together with copies of 3 recent testimonials, to be sent to the Medical Administrator, Hitchin Hospitals, Lister Hospital, Hitchin, Herts, as soon as possible.

HOUNSLOW HOSPITAL, Staines-road, Hounslow, MIDDLESEX. (General Acute—81 Beds.) Locum RESIDENT SURGICAL REGISTRAR required for 2 weeks commencing 23rd April, 1955. Salary £17 10s. per week, less charge for residence at the rate of £170 p.a.

Apply to Hospital Secretary (HOUnslow 4448/9).

HUNTINGDON COUNTY HOSPITAL. Applications are invited for the post of HOUSE OFFICER (medical) at this Hospital which is approved by the licensing authority for Pre-registration Service. The selected candidate will be required to look after medical and pædiatric cases and may be called upon to give emergency anæsthetics. Post vacant towards the end of April.

Apply, with full particulars, and names of 2 referees, to Group Secretary, Hospital Management Committee Offices, Newmarket General Hospital, Newmarket, Suffolk.

HUNTINGDON COUNTY HOSPITAL. Applications are invited for the post of HOUSE OFFICER (surgical) at this Hospital, which is approved by the licensing authority for Pre-registration Service. Post vacant towards the end of April.

Applications, giving full particulars, and names of 2 referees, to the Group Secretary, Hospital Management Committee Offices, Newmarket General Hospital, Newmarket, Suffolk.

LEAMINGTON SPA. WARNEFORD GENERAL HOSPITAL. (207 Beds.) Applications are invited for HOUSE OFFICER (anæsthetics). The post is recognised for D.A.

Applications to Hospital Secretary.

IPSWICH BOROUGH GENERAL HOSPITAL, Heath-road, IPSWICH. (270 Beds.) Applications are invited for the post of SENIOR HOUSE OFFICER (Fracture and Orthopædic Department). The post, which is now vacant is normally of 1 years duration. It is recognised as part of the necessary surgical experience for the Final F.R.C.S.

Applications, stating age, qualifications and experience, together with recent testimonials to the Hospital Secretary.

IPSWICH. EAST SUFFOLK AND IPSWICH HOSPITAL. (356 Beds.) Applications are invited for the post of SENIOR HOUSE SURGEON to the Fracture and Orthopædic Department. The post is graded Senior House Officer and is recognised for the F.R.C.S. examinations. The Department has 2 Consultants, about 60 beds, and a large outpatient attendance; it offers wide experience.

Applications, stating age, nationality, and experience, together with copies of recent testimonials, to Hospital Secretary.

IPSWICH. EAST SUFFOLK AND IPSWICH HOSPITAL. (360 Beds.) Applications are invited for the post of HOUSE SURGEON to the Fracture and Orthopædic Department. Approved pre-registration post.

Applications with copies of recent testimonials, to the Hospital Secretary.

ISLEWORTH. WEST MIDDLESEX HOSPITAL. South WEST MIDDLESEX HOSPITAL MANAGEMENT COMMITTEE. SENIOR HOUSE OFFICER (Orthopædic Unit). Post recognised for F.R.C.S. Candidates should have held medical and general surgical posts and preference will be given to those who have also had orthopædic experience.

Applications, stating age, experience and qualifications enclosing up to 3 testimonials, to Group Secretary, West Middlesex Hospital, Isleworth, by 6th April, 1955.

ISLEWORTH. WEST MIDDLESEX HOSPITAL. South WEST MIDDLESEX HOSPITAL MANAGEMENT COMMITTEE. HOUSE OFFICER (Orthopædic Unit). Preference given to pre-registration candidates. Post recognised for F.R.C.S.

Applications, stating age, experience and qualifications and enclosing copies of up to 3 testimonials, to Group Secretary, West Middlesex Hospital, Isleworth, by 6th April, 1955.

ISLEWORTH. WEST MIDDLESEX HOSPITAL. South WEST MIDDLESEX HOSPITAL MANAGEMENT COMMITTEE. HOUSE OFFICER (Anæsthetics), resident. Post recognised by the Faculty of Anæsthetists.

Applications, stating age, qualifications with copies of up to 3 recent testimonials, to Group Secretary, West Middlesex Hospital, Isleworth, by 29th March, 1955.

ISLEWORTH. WEST MIDDLESEX HOSPITAL. (1143 Beds.) **NORTH WEST METROPOLITAN REGIONAL HOSPITAL BOARD.** REGISTRAR (whole-time) in Obstetrics and Gynæcology, vacant now. 1 year in first instance. Post approved for M.R.C.O.G. Hospital may be visited by direct appointment.

Application forms obtainable from, and returnable to, Group Secretary, South West Middlesex Hospital Management Committee, West Middlesex Hospital, Isleworth, by 6th April, 1955.

KIRKCALDY GENERAL HOSPITAL. (74 surgical beds.) HOUSE OFFICER required as at 1st April, 1955. The post qualifies for pre-registration.

Apply, with copies of 2 recent testimonials, to the Medical Superintendent, East Fife Hospitals Board of Management, 243a, High-street, Kirkcaldy.

LANCASTER MOOR HOSPITAL, Lancaster. (Regional Mental Hospital.) MANCHESTER REGIONAL HOSPITAL BOARD. Applications invited for post of RESIDENT or NON-RESIDENT REGISTRAR (2 vacancies), Male or Female. Preference to candidates who have held house appointments at general hospitals. Unfurnished house in Hospital grounds available for married applicants if required; furnished quarters for single persons. Hospital recognised for D.P.M., and facilities provided for attending courses of instruction at neighbouring universities. All modern methods of investigation and treatment carried out; outpatient clinics (4) staffed from Hospital.

Apply Medical Superintendent.

LUTON, BEDFORDSHIRE. ST. MARY'S HOSPITAL. Applications are invited for the post of SENIOR HOUSE OFFICER at St. Mary's Hospital, Luton (129 Beds mainly for chronic sick and 33 Beds for chest diseases), vacant 14th April, 1955. The post includes outpatient work in the chest clinic.

Applications, stating age, nationality, qualifications and experience, together with copies of 3 recent testimonials, should be sent to the Secretary, Luton and Hitchin Hospital Management Committee, St. Mary's Hospital, Luton, Beds., as soon as possible.

LUTON CHEST CLINIC, Grove-road, Luton. North WEST METROPOLITAN REGIONAL HOSPITAL BOARD. Whole-time REGISTRAR (resident preferred), required 25th April, 1955, at the above Clinic. Appointment will include duties in attached medical wards in St. Mary's Hospital, at Hitchin Chest Clinic, and attendance at sessions for minor thoracic surgery. Good training in general medicine as well as experience in treatment of tuberculosis and diseases of the chest essential. Successful candidate would be encouraged to pursue further postgraduate studies. Clinic may be visited by direct appointment.

Application forms obtainable from, and returnable to, Secretary, Luton and Hitchin Group Hospital Management Committee, St. Mary's Hospital, Luton, Beds., by 11th April, 1955.

LIVERPOOL RADIUM INSTITUTE, Liverpool, 7. Applications are invited for a resident post in the JUNIOR HOSPITAL MEDICAL OFFICER grade. Salary scale £775–£50–£1075 according to experience. This appointment is particularly valuable to practitioners who contemplate adopting radiotherapy as a special career. On the other hand, it provides an excellent opportunity for studying for a higher qualification either in medicine or in surgery.

Applications, giving particulars of age and experience, together with names and addresses of 2 referees, should reach the Medical Director as soon as possible.

LIVERPOOL (near). MOSS SIDE HOSPITAL, Maghull, near LIVERPOOL. (460 Beds for mental defectives exhibiting conduct disorders.) RESIDENT JUNIOR HOSPITAL MEDICAL OFFICER (tenure 3 years) or REGISTRAR. Hospital recognised for D.P.M. training.

Applications, naming 3 referees, to Medical Superintendent by 16th April, 1955. Candidates may visit Hospital by appointment.

LEIGH INFIRMARY, Leigh, Lancashire. (102 Beds.) Applications are invited for the post of SENIOR HOUSE OFFICER (anæsthetics) for duties at the above and other hospitals in the Group. The post which is tenable for 1 year will be resident, and is recognised for the D.A. and F.F.A.R.C.S. examinations. Wide experience in all branches of anæsthesia is available and there are particular facilities for experience in major thoracic and orthopædic work.

Applications, with names of 2 referees, to undersigned as soon as possible. T. W. HURST, Secretary,

Wigan and Leigh Hospital Management Committee.

Knowsley House, Wigan.

LEEDS, 2. PUBLIC DISPENSARY AND HOSPITAL. LEEDS A GROUP HOSPITAL MANAGEMENT COMMITTEE. Applications are invited from registered medical practitioners for the appointment of CASUALTY OFFICER (Senior House Officer) at the above Hospital. The appointment will be for a period of 1 year. Salary in accordance with the agreed terms and conditions of service of hospital medical and dental staffs, with an appropriate deduction in respect of board, lodging, &c.

Applications, stating age, qualifications, experience, &c., together with the names of 2 referees, to be forwarded to the undersigned as soon as possible.

J. FOLKARD, Secretary to the Committee.

Administrative Offices, St. James's Hospital, Leeds, 9.

LEEDS REGIONAL HOSPITAL BOARD invites applications for the following REGISTRAR posts :—

Chest Diseases

Scotton Banks Sanatorium, Knaresborough (resident), 306 Beds. Visiting staff includes Teaching Hospital Consultants.

Geriatrics

Bradford A and B Groups. Work primarily with Consultant Geriatrician in Admission Unit at St. Luke's Hospital, with additional duties at Thornton View Hospital. Offers excellent experience of an area geriatric service. Aggregate of 728 Beds.

Obstetrics and Gynæcology

Wakefield A and B Groups (with occasional duties in Pontefract and Goole Groups) (non-resident). Offers good experience but is not at present recognised by the R.C.O.G. for membership purposes. Aggregate of 120 obstetric and 50 gynæcological beds.

General Surgery

(*a*) York A and Tadcaster Group (resident or non-resident) for duties mainly at York County and City Hospitals. Aggregate of 150 general surgical and 50 orthopædic surgery beds. Duties approximately divided between general and orthopædic surgery.

(*b*) Halifax General Hospital (50 surgical beds) and Halifax Royal Infirmary (60 orthopædic beds). Duties approximately divided between general and orthopædic surgery (preferably resident).

Psychiatry

Broadgate Hospital, Beverley (600 Beds). Accommodation for single person (resident or non-resident). If desired facilities for attendance at the Leeds University will be provided if the successful candidate is studying for the D.P.M.

Thoracic Surgery

Regional Thoracic Centre (56 Beds), Pinderfields General Hospital, Wakefield. Previous experience in thoracic work desirable. The beds are under the charge of the Consultants to the Teaching Hospital and the post may in future be linked with the Unit at the General Infirmary at Leeds (resident, married quarters available).

Applications, stating age, qualifications and details of present and previous appointments with dates, together with the names and addresses of 3 referees, should be forwarded to the Secretary, Joint Registrars Committee, Park-parade, Harrogate, not later than 5th April, 1955.

LEEDS, 9. ST. JAMES'S HOSPITAL. Leeds A Group HOSPITAL MANAGEMENT COMMITTEE. Applications are invited from registered medical practitioners (Male and Female) for the appointment of SENIOR HOUSE OFFICER (orthopædics). The appointment, which is recognised by the Royal College of Surgeons for Fellowship, will be for a period of 1 year and the salary will be in accordance with the agreed terms and conditions of service of hospital medical and dental staffs—namely, £745 p.a. with an appropriate deduction in respect of board, lodgings and other services provided.

Applications, stating age, qualifications, experience, &c., together with the names of 2 referees, to be forwarded to the undersigned as soon as possible.

J. FOLKARD, Secretary to the Committee.

Administrative Offices, St. James's Hospital, Leeds, 9.

LEEDS. THE UNITED LEEDS HOSPITALS. The GENERAL INFIRMARY AT LEEDS. SENIOR HOUSE OFFICER in Neurosurgery required for a period of 6 months from 1st May, 1955. The appointment will be renewable for a further period of 6 months. Terms and conditions of service for hospital medical staff apply.

Applications, giving details of age, qualifications, posts held with dates, and with 3 names for reference, should be sent to the Secretary to the Board as soon as possible.

LEEDS. THE UNITED LEEDS HOSPITALS. The GENERAL INFIRMARY AT LEEDS. REGISTRAR in Neurosurgery required. The main duties of the post are centred at the General Infirmary at Leeds but will include sessions at Regional Hospitals. Whitley Council salary scale applies.

Applications, stating age, qualifications, experience with dates, and 3 names for reference, should be sent to the Sub-Dean, School of Medicine, Leeds, 2, as soon as possible.

LEEDS. THE UNITED LEEDS HOSPITALS. The GENERAL INFIRMARY AT LEEDS. REGISTRAR in Anæsthetics required for duties in the Teaching Hospital Group. Terms and conditions of service for hospital medical staff apply.

Applications, stating age, qualifications, experience with relevant dates, and giving 3 names for reference, should be forwarded to the Sub-Dean, The Medical School, Leeds, 2, not later than 31st March, 1955.

MACCLESFIELD, CHESHIRE. PARKSIDE MENTAL HOSPITAL. PARKSIDE HOSPITAL MANAGEMENT COMMITTEE. MANCHESTER REGIONAL BOARD. RESIDENT REGISTRAR in Psychiatry required at above Hospital.

Applications to be made to the Medical Superintendent, accompanied by 2 recent testimonials, within 14 days of the appearance of this advertisement.

MAIDSTONE. KENT COUNTY OPHTHALMIC AND AURAL HOSPITAL. (113 Beds.) MID-KENT HOSPITAL MANAGEMENT COMMITTEE. Applications are invited for the appointment of SENIOR HOUSE SURGEON in the E.N.T. Department of the above Hospital. Post vacant April, 1955. There are 55 E.N.T. beds and 6 specialist operating sessions each week. Valuable experience is available, and the post is recognised for the purpose of the F.R.C.S. and the D.L.O. Salary will be £745 a year, less £150 a year for residential emoluments.

Applications immediately to the Administrative Officer, Kent County Ophthalmic and Aural Hospital, Maidstone, Kent.

MAIDSTONE. WEST KENT GENERAL HOSPITAL. (141 Beds.) MID-KENT HOSPITAL MANAGEMENT COMMITTEE. Applications are invited for the appointment of RECEIVING ROOM OFFICER. Post vacant now. Salary £745 a year, with a deduction of £150 a year for residential emoluments.

Applications to the Administrative Officer at the Hospital as soon as possible.

MANCHESTER REGIONAL HOSPITAL BOARD. Applications are invited for the post of REGISTRAR in Chest Diseases, the main duties to be with the Bury and Rossendale Hospital Management Committee, with duties at Chest Clinics and at Aitken Sanatorium and Peel Hall Pulmonary Hospital, and other hospitals in the area.

Apply, stating names of 2 referees, to—

H. WILKINSON, Group Secretary.

Bury General Hospital, Bury, Lancs.

MANCHESTER. UNITED MANCHESTER HOSPITALS. MANCHESTER ROYAL EYE HOSPITAL. Applications are invited for SENIOR HOUSE OFFICER post. Salary £745 p.a., less £155 p.a. for residential emoluments.

Application forms may be obtained from the undersigned.

H. R. NORTH, General Superintendent.

MANCHESTER. WEST MANCHESTER HOSPITAL MANAGEMENT COMMITTEE. PARK HOSPITAL, DAVYHULME. (General Hospital—433 Beds.) 1 SENIOR HOUSE OFFICER (paediatrics) required. Post vacant 1st May, 1955. Hospital recognised for training for Diploma in Child Health.

Forms from Secretary.

MANCHESTER. WEST MANCHESTER HOSPITAL MANAGEMENT COMMITTEE. PARK HOSPITAL, DAVYHULME. (General Hospital—433 Beds.) RESIDENT SENIOR HOUSE OFFICER (pathology) required. Post vacant end of May, 1955.

Forms from Secretary.

MEDWAY AND GRAVESEND HOSPITAL MANAGE-MENT COMMITTEE. Locum SURGICAL REGISTRAR, based at St. Bartholomew's Hospital, Rochester, required immediately for some months. A higher qualification desirable. Resident or non-resident. Salary £17 10s. per week.

Apply, with full details, to Group Secretary, 20, Star-hill, Rochester, Kent.

MEDWAY AND GRAVESEND HOSPITAL MANAGE-MENT COMMITTEE. Temporary REGISTRAR in Obstetrics and Gynæcology required for 3 months or possibly longer. Salary scale £850/£965 p.a., according to experience.

Apply, with full details and testimonials, to Group Secretary, Medway and Gravesend Hospital Management Committee, 20, Star-hill, Rochester, Kent.

MIDDLESBROUGH (near). POOLE HOSPITAL, Nun-THORPE, MIDDLESBROUGH. (Tuberculosis—324 Beds.) Applications are invited for the appointment of RESIDENT MEDICAL OFFICER for general duties on medical and surgical wards (adults and children) at the above modern hospital for a period to be agreed. Salary appropriate to grade of Junior Hospital Medical Officer, viz., £775–£50–£1075 p.a.

Applications, stating age, nationality, qualifications and previous experience, and names of 3 referees, to be sent immediately to the Group Secretary, Cleveland Hospital Management Committee, West Lane Hospital, Middlesbrough.

MORPETH (near). STANNINGTON CHILDREN'S HOSPITAL, STANNINGTON, near MORPETH. Applications are invited for the post of ASSISTANT MEDICAL OFFICER (Junior Hospital Medical Officer grade). Salary within the scale of £775–£50–£1075 p.a., in accordance with and subject to the agreed terms and conditions of service. In this Hospital children up to the age of 16 years suffering from any form of tuberculosis are admitted. The bed complement is 203, at present the average number of beds occupied is 165. Valuable experience can be obtained in the treatment of childhood tuberculosis or any orthopædic tuberculosis. The visiting Consulting staff are associated with teaching and other hospitals.

Applications, giving full particulars of past and present appointments, qualifications, and the names of 3 persons to whom reference can be made, should be forwarded as early as possible to the Medical Superintendent.

OXFORD. WINGFIELD-MORRIS ORTHOPÆDIC HOS-PITAL. Applications are invited from suitably qualified persons for a SENIOR HOUSE OFFICER grade appointment from 1st May, 1955.

Applications, with names of referees, to be submitted to the Secretary within 14 days of this advertisement.

NEWCASTLE GENERAL HOSPITAL. Newcastle upon TYNE HOSPITAL MANAGEMENT COMMITTEE. DEPARTMENT OF OBSTETRICS. (70 Beds.) The resident post of OBSTETRICAL HOUSE SURGEON becomes vacant on 1st May, 1955. This post is recognised for the purpose of Pre-registration Service and preference will be given to provisionally registered persons who have served 6 months in a medical or surgical post since qualification. The department is recognised for the Diploma of M.R.C.O.G., and D.Obst.R.C.O.G., and undertakes the training of Medical Students in the University of Durham.

Applications should be addressed to the Secretary, Newcastle General Hospital, Westgate-road, Newcastle upon Tyne, 4, together with 1 copy of 2 recent testimonials, by 16th April, 1955.

NEWCASTLE GENERAL HOSPITAL. (847 Beds.) NEWCASTLE UPON TYNE HOSPITAL MANAGEMENT COMMITTEE. The resident post of SENIOR HOUSE OFFICER (Male), Urological Unit (51 Beds), is now vacant and is tenable for 12 months.

Applications should be addressed to the Secretary, Newcastle General Hospital, Westgate-road, Newcastle upon Tyne, 4, together with 1 copy of 2 recent testimonials.

NEWCASTLE. THE UNITED NEWCASTLE UPON TYNE HOSPITALS. Applications are invited for the resident appointment of SENIOR HOUSE OFFICER in the Children's Department at the Royal Victoria Infirmary. The Department is responsible for the care of patients in the children's wards and outpatient clinic of the Royal Victoria Infirmary and in the Babies' Hospital, and for the care of infants in the Princess Mary Maternity Hospital. The appointment is for 1 year and will be subject to the terms and conditions of service of hospital medical staff in the National Health Service. The successful candidate will work at the Princess Mary Maternity Hospital.

Applications, giving full details and the names and addresses of 3 referees, should be sent to the undersigned within 2 weeks of the appearance of this advertisement.

A. W. SANDERSON, House Governor and Secretary.

Royal Victoria Infirmary, Newcastle upon Tyne.

NEWCASTLE. THE UNITED NEWCASTLE UPON TYNE HOSPITALS. Applications are invited for the whole-time appointment of SENIOR REGISTRAR in the Department of Anæsthetics at the Royal Victoria Infirmary, which is associated with the Medical School of the University of Durham. The post, which is non-resident except for rotational emergency duty, offers certain facilities for laboratory and clinical investigation. The appointment will be for 1 year in the first instance and is subject to terms and conditions of service of hospital medical staff in the National Health Service. Applicants should have had considerable experience in anæsthesia and should hold the F.F.A.R.C.S. or the D.A.

Applications, giving full details and the names and addresses of 3 referees, should be sent to the undersigned within 2 weeks of the appearance of this advertisement.

A. W. SANDERSON, House Governor and Secretary.

Royal Victoria Infirmary, Newcastle upon Tyne.

NEWCASTLE. THE UNITED NEWCASTLE UPON TYNE HOSPITALS. Applications are invited for the whole-time non-resident appointment of SENIOR MEDICAL REGISTRAR in the first year tenable at the Royal Victoria Infirmary. The appointment is for 1 year in the first instance and may be renewed to a maximum of 4 years. The appointment will be subject to terms and conditions of service of hospital medical and dental staffs in the National Health Service. In any reappointment the successful candidate may be required to undertake duty in a hospital under the Newcastle Regional Hospital Board.

Applications, giving full details and the names and addresses of 3 referees, should be sent to the undersigned within 2 weeks of the appearance of this advertisement.

A. W. SANDERSON, House Governor and Secretary.

Royal Victoria Infirmary, Newcastle upon Tyne.

NEWCASTLE. THE UNITED NEWCASTLE UPON TYNE HOSPITALS. Applications are invited for the whole-time appointment of REGISTRAR in the Department of Anæsthetics at the Royal Victoria Infirmary, which is associated with the Medical School of the University of Durham. The post, which is non-resident except for rotational emergency duty, will be for 1 year in the first instance and is subject to Ministry of Health terms and conditions of service. It offers the opportunity for study for the F.F.A.R.C.S. examination. Applicants should have held postgraduate appointments in medicine and surgery and should have had some experience in anæsthetics.

Applications, giving full details and the names and addresses of 3 referees, should be sent to the undersigned within 2 weeks of the appearance of this advertisement.

A. W. SANDERSON, House Governor and Secretary.

Royal Victoria Infirmary, Newcastle upon Tyne.

NEWCASTLE UPON TYNE HOSPITAL MANAGE-MENT COMMITTEE. Applications are invited from registered medical practitioners for the post of SENIOR HOUSE OFFICER (preferably resident) at the Newcastle Eye Hospital (31 Beds) and the Eye Unit at Walker Clinical Annexe (21 Beds). The Hospital is recognised for the Diploma of Ophthalmology. Previous experience in ophthalmology will be an advantage. Salary in accordance with the terms and conditions of service of hospital medical and dental staffs.

Applications, with the names of 3 referees, should be sent to the Hospital Secretary, Eye Hospital, St. Mary's-place, Newcastle upon Tyne, as soon as possible.

NEWMARKET GENERAL HOSPITAL. (330 Beds.) EAST ANGLIAN REGIONAL HOSPITAL BOARD. ANÆSTHETIC REGISTRAR. Post recognised for D.A. Appointment for 1 year, renewable for second year.

Applications, stating age, experience and names of 3 referees, to Secretary of Board, 117, Chesterton-road, Cambridge, by 11th April, 1955. Candidates invited to visit Hospital by direct arrangement with Physician-Superintendent at the Hospital.

NEWPORT, MONMOUTHSHIRE. ROYAL GWENT HOSPITAL. (260 Beds. 10 Residents. Recognised F.R.C.S.) SENIOR HOUSE OFFICER required for Casualty Department in early April. This is the base Hospital in the Group and all medical and surgical emergencies are admitted through casualty, which is under the full-time charge of a Senior Hospital Medical Officer, there being also 2 Senior House Officers. A new Department with excellent facilities and accommodation has recently been opened. Post recognised F.R.C.S. for 6 months and tenable 6 or 12 months as desired. Salary £745, less £125 board-residence.

Write, quoting 2 referees, to T. A. JONES, Group Secretary. 64, Cardiff-road, Newport Mon.

NEWTON ABBOT HOSPITAL. (General Section 65 Beds.) RESIDENT SENIOR HOUSE SURGEON (Male or Female) required approximately 25th March, 1955.

Applications (quoting reference F.364/28), stating qualifications, nationality, age, with copy testimonials, to be sent to the Group Secretary, Torquay District Hospital Management Committee, Torbay Hospital, Torquay.

NOTTINGHAM. CITY HOSPITAL. (804 Beds.) Applications are invited for the post of SENIOR HOUSE OFFICER (pædiatrics), vacant 1st May, 1955. The post is approved for the D.C.H.

Applications, stating age, nationality, qualifications and experience, together with copies of not more than 3 testimonials, to be sent to the Secretary, City Hospital, Hucknall-road, Nottingham.

NOTTINGHAM. CITY HOSPITAL. (804 Beds.) Applications are invited for the post of GYNÆCOLOGICAL HOUSE OFFICER (recognised for pre-registration purposes) which will be graded Senior House Officer or House Officer in accordance with experience. Recognised for M.R.C.O.G. Post vacant on 1st April.

Applications, stating age, nationality, qualifications, and experience, together with copies of not more than 3 testimonials, to be sent to the Hospital Secretary, City Hospital, Hucknall-road, Nottingham.

NOTTINGHAM GENERAL HOSPITAL. Applications are invited from registered medical practitioners for the post of THIRD CASUALTY OFFICER (Senior House Officer grade). Salary (less £150 emoluments) and conditions of service in accordance with those laid down by the Ministry. Duties to commence on or about 9th April, 1955. This post offers wide experience of casualty work. The staff establishment requires only 1 night in 3 emergency work, and off duty permits time for study for higher examinations.

Applications, stating age, qualifications, and experience, together with copies of testimonials, to be sent to—

HENRY M. STANLEY.

OXFORD. UNIVERSITY OF OXFORD. Oxford REGIONAL HOSPITAL BOARD. Applications are invited for the post of SENIOR REGISTRAR in Psychiatry at Littlemore Hospital, Oxford. The successful candidate (who should hold the D.P.M. or its equivalent) may be asked to spend part of the tenure at other mental hospitals in the Region. There are facilities for postgraduate study, University teaching and psychiatric outpatient work. Residential accommodation available for single person. Further information may be obtained from the Physician-Superintendent.

Applications on forms obtainable from the Secretary, Oxford Regional Hospital Board, 43, Banbury-road, Oxford, must reach him by 15th April, 1955.

PONTEFRACT GENERAL INFIRMARY. Resident CASUALTY OFFICER required, graded Senior House Officer. Recognised for Fellowship. Married accommodation available.

Apply Secretary, Great Northern House, Salter-row, Pontefract, Yorkshire.

POOLE GENERAL HOSPITAL, Poole, Dorset. Bourne-MOUTH AND EAST DORSET HOSPITAL MANAGEMENT COMMITTEE. SOUTH WEST METROPOLITAN REGIONAL HOSPITAL BOARD. Applications are invited for the appointment of RESIDENT MEDICAL REGISTRAR. The post is tenable for 1 year in the first instance, to commence on 15th June, 1955.

Forms of application, obtainable from the Group Secretary, Bournemouth and East Dorset Hospital Management Committee, Royal Victoria Hospital, Gloucester-road, Boscombe, Bournemouth, should be returned to him, duly completed, within 8 days of the appearance of this advertisement.

PORTSMOUTH GROUP HOSPITAL MANAGEMENT COMMITTEE. Applications are invited for the following appointments :—

SENIOR HOUSE OFFICER, E.N.T. Department (61 Beds), vacant now for duties at Queen Alexandra Hospital.

Royal Portsmouth Hospital

HOUSE OFFICER required Orthopædic Department (104 Beds), vacant now.

Locum CASUALTY OFFICER required (Senior House Officer grade), for 6 weeks from the end of March.

Applications, stating age, experience and qualifications, together with names of 2 referees, should be forwarded as soon as possible to L. C. ROGERS.

35, Grove-road South, Southsea.

PORTSMOUTH GROUP HOSPITAL MANAGEMENT COMMITTEE. SOUTH WEST METROPOLITAN REGIONAL HOSPITAL BOARD. Applications are invited for the post, vacant 16th July, 1955, of NON-RESIDENT OPHTHALMIC REGISTRAR at the Portsmouth Eye and Ear Hospital with (rarely) duties at other hospitals in the Group. Preference will be given to candidates holding a specialist qualification.

Forms of application may be obtained from the Acting Group Secretary, Portsmouth Group Hospital Management Committee, 35, Grove-road South, Southsea, which should be returned to him duly completed on or before 4th April, 1955. Canvassing will disqualify, but it is hoped that candidates will visit the Hospital by arrangement with the Acting Group Secretary.

PERTH ROYAL INFIRMARY. Applications are invited for the post of CASUALTY OFFICER (House Surgeon or Senior House Surgeon grade according to experience) which will fall vacant in April, 1955. This post is recognised for Pre-registration Hospital Service, and by the Royal College of Surgeons under regulations for the F.R.C.S.

Applications, giving details of experience and names of 2 referees, should be sent to the Group Medical Superintendent, Perth Royal Infirmary, Perth.

REDHILL. EAST SURREY HOSPITAL, Shrewsbury-road. (139 Beds.) HOUSE SURGEON (Male) required, preferably second appointment.

Apply to the Hospital Secretary.

ROCHFORD, ESSEX. GENERAL HOSPITAL. Locum GERIATRIC REGISTRAR required at the above Hospital for a period of approximately 2 months from 2nd April, 1955. The unit consists of 120 beds and an outpatients clinic under the general direction of a Consultant. A wide range of facilities are available at the Hospital for investigation, treatment and rehabilitation of acute and chronic sick.

Apply to the Secretary as soon as possible.

ROMFORD, ESSEX. RUSH GREEN HOSPITAL. (301 Beds.) SENIOR HOUSE OFFICER for the Regional Poliomyelitis Unit (27 Beds) and in general medicine, vacant from 1st May, 1955.

Apply to Medical Superintendent.

ROMFORD, ESSEX. VICTORIA HOSPITAL. (99 Beds.) RESIDENT HOUSE SURGEON (Male), required from 19th April, 1955. (Post not approved for pre-registration purposes.)

Applications should be forwarded immediately to the Secretary, Romford Group Hospital Management Committee, Oldchurch Hospital, Romford.

ROMFORD, ESSEX. VICTORIA HOSPITAL. (99 Beds.) RESIDENT HOUSE PHYSICIAN (Male) required. (Post not approved for pre-registration purposes.)

Applications should be forwarded immediately to the Secretary, Romford Group Hospital Management Committee, Oldchurch Hospital, Romford.

SALISBURY GENERAL HOSPITAL. Salisbury Group HOSPITAL MANAGEMENT COMMITTEE. Applications are invited for the post of RESIDENT HOUSE SURGEON (obstetric and Gynæcological Unit) which is now vacant. Pre-registration candidates may apply. The Unit comprises 40 obstetric and 35 gynæcological beds and is recognised for the Diploma and Membership of the Royal College.

Applications, stating age, nationality, qualifications, experience, and enclosing a recent testimonial and the names and addresses of 2 referees, to the Group Secretary, Odstock Hospital, Salisbury.

SCOTLAND. EASTERN REGIONAL HOSPITAL BOARD. Dermatology. Applications are invited for the post of REGISTRAR in Dermatology at Dundee Royal Infirmary, a General Teaching Hospital of 510 Beds associated with the University of St. Andrews. Salary and conditions of service in accordance with national agreement.

Further particulars and forms of application from the Secretary to the Board, "Braeknowe," 430, Blackness-road, Dundee, with whom applications must be lodged not later than 9th April, 1955.

SCOTLAND. SOUTH-EASTERN REGIONAL HOS-PITAL BOARD. Applications are invited for the appointment of REGISTRAR in the Regional Pool of Anæsthetists, based on the Royal Infirmary of Edinburgh. The appointment is subject to the terms and conditions of the National Health Service.

Applications, giving particulars of age, qualifications, and previous experience, together with the names of 2 referees, should be submitted to the Secretary, South-Eastern Regional Hospital Board, Scotland, 11, Drumsheugh-gardens, Edinburgh, 3, by 16th April, 1955.

SCOTLAND. SOUTH-EASTERN REGIONAL HOS-PITAL BOARD. Applications are invited for the appointment of SENIOR REGISTRAR in Surgery at the Royal Infirmary of Edinburgh. The appointment is subject to National Health Service regulations.

Applications, giving particulars of age, qualifications and previous experience, together with the names of 3 referees, should be submitted to the Secretary, South-Eastern Regional Hospital Board, Scotland, 11, Drumsheugh-gardens, Edinburgh, 3, by 16th April, 1955.

SHEFFIELD, 6. MIDDLEWOOD HOSPITAL. (2000 Beds.) SHEFFIELD NO. 2 HOSPITAL MANAGEMENT COMMITTEE. Applications are invited from Male or Female officers for the appointment of JUNIOR HOSPITAL MEDICAL OFFICER or SENIOR HOUSE OFFICER at Middlewood Mental Hospital. Living quarters and residential services are available for single officers and a small furnished flatlet for a married couple with no children. There are good facilities for postgraduate study for the D.P.M. and there is full collaboration with the general hospital situate in the same grounds. Excellent laboratory and other special departments. Extensive psychiatric outpatient service.

Applications, stating age, qualifications, and experience, together with names and addresses of 2 referees, should be forwarded immediately to the Medical Superintendent.

SHEFFIELD REGIONAL HOSPITAL BOARD. Temporary NON-RESIDENT SENIOR REGISTRAR (radiotherapy) required at the Sheffield National Centre for Radiotherapy, to fill a vacancy during the present incumbent's period of national service. Appointment for initial period of 1 year, which may be extended to 2 years. Applicants should possess D.M.R.T.

Apply to Secretary, Sheffield Regional Hospital Board, Old Fulwood-road, Sheffield, by 11th April, 1955, giving age, nationality, qualifications, present and previous appointments with dates, date available, and naming 3 referees.

SHEFFIELD REGIONAL HOSPITAL BOARD. Whole-time NON-RESIDENT SENIOR REGISTRAR in Radiology required on 12th April, for approximately 9 notional half-days per week at the City General Hospital, Sheffield, and approximately 2 notional half-days per week at the Barnsley Hospitals. Candidates should hold a Diploma in Diagnostic Radiology. Appointment for 1 year in the first instance reviewable annually. It has been agreed between the Sheffield Regional Hospital Board and the Board of Governors of the United Sheffield Hospitals that subject to satisfactory work and progress the tenure of the appointment will be divided between the City General Hospital, Sheffield, and Barnsley Hospitals and the Teaching Hospitals.

Apply to Secretary, Sheffield Regional Hospital Board, Old Fulwood-road, Sheffield, by 11th April, 1955, giving age, nationality, qualifications, present and previous appointments with dates, naming 3 referees.

SHEFFIELD. LODGE MOOR HOSPITAL. (496 Beds.) SHEFFIELD REGIONAL HOSPITAL BOARD. Whole-time RESIDENT REGISTRAR (infectious diseases) required. Appointment for 1 year in first instance.

Apply to Secretary, Sheffield Regional Hospital Board, Old, Fulwood-road, Sheffield, by 4th April, 1955, giving age, nationality, qualifications, present and previous appointments with dates, naming 3 referees.

SHEFFIELD. THE UNITED SHEFFIELD HOSPITALS. Applications are invited for the following posts :—

(*a*) NON-RESIDENT SENIOR REGISTRAR in Radiology at the Royal Infirmary/Royal Hospital Units. Candidates should hold a Diploma in Diagnostic Radiology. The appointment is for 1 year in the first instance and will be reviewed annually. It has been agreed in principle between the Board of Governors of The United Sheffield Hospitals and the Sheffield Regional Hospital Board that the appointment, if extended to the full period of 4 years, will be divided, subject to satisfactory work and progress, between The United Sheffield Hospitals and a hospital in the Region.

Closing date for applications 31st March, 1955.

(*b*) SURGICAL REGISTRAR. Post vacant 11th May, 1955. The successful candidate will work on a rotation basis between the Royal Infirmary and Children's Hospital Units. It is intended, if possible, that the holder of the post will spend equal periods in the Orthopædic Department and on each of 2 surgical firms at the Royal Infirmary ; and for a period at the Children's Hospital.

Closing date for applications 5th April, 1955.

Applications for both posts should state age, qualifications and experience, give the names of 3 referees and be sent to the Chief Administrative Officer, The United Sheffield Hospitals, West-street, Sheffield, 1.

SIDCUP, KENT. QUEEN MARY'S HOSPITAL. Sidcup AND SWANLEY HOSPITAL MANAGEMENT COMMITTEE. Applications are invited for the post of SENIOR HOUSE OFFICER (orthopædics). Salary £745 p.a. The post, which will be vacant from 1st April, 1955, offers good facilities for experience in this specialty and is recognised for the examinations of the Royal College of Surgeons. The Hospital is situated in pleasant surroundings and is within half an hour's travelling time of London.

Applications to the Secretary, Queen Mary's Hospital, Sidcup, Kent.

SLOUGH, BUCKINGHAMSHIRE. UPTON HOSPITAL. Locum SENIOR HOUSE OFFICER (casualty) required, 1 of 2, for post vacant 1st April.

Applications, together with 2 testimonials, to Hospital Secretary.

SOUTHAMPTON GENERAL HOSPITAL. (471 Beds.) RESIDENT HOUSE PHYSICIAN required about 24th April. Pre-registration candidates eligible.

Applications, with copies of testimonials, should be forwarded as soon as possible to the Group Secretary, Southampton Group Hospital Management Committee, Bullar-street, Southampton.

SOUTHAMPTON. ROYAL SOUTH HANTS HOSPITAL. (278 Beds. Recognised for F.R.C.S.) RESIDENT HOUSE SURGEON required about 20th April. Pre-registration candidates eligible.

Applications, with copies of testimonials, should be forwarded to the Group Secretary, Southampton Group Hospital Management Committee, Bullar-street, Southampton, as soon as possible.

SOUTHEND GENERAL HOSPITAL. Applications are invited for the post of SENIOR HOUSE OFFICER to the Orthopædic and Fracture Departments. Post vacant 9th May, 1955. The Orthopædic and Accident Department of this Hospital is the centre for reference of all cases from a large surrounding area, and the post offers excellent experience in all aspects of orthopædic and traumatic surgery under the supervision of and with instructions from the Consultant-in-charge. Post recognised for the F.R.C.S.

Applications, stating age, qualifications and experience, together with copies of 3 recent testimonials, should be sent to the undersigned by 7th April, 1955.

J. C. FIELD, Secretary.

SOUTHEND GENERAL HOSPITAL. Temporary CASUALTY OFFICER required (Registrar grade) on a month to month basis, to commence 7th May, 1955. Duties chiefly in Casualty Department, which is under the supervision of Consultant in Orthopædic Surgery. Opportunities for work in Fracture Clinics in association with work of Orthopædic Department. Post recognised for F.R.C.S. if held for 6 months.

Applications, stating age, qualifications, and experience, to be sent to the undersigned by 31st March, 1955.

J. C. FIELD, Secretary.

STOKE-ON-TRENT. NORTH STAFFORDSHIRE ROYAL INFIRMARY. (455 Beds.) SENIOR HOUSE OFFICER in Orthopædics vacant shortly.

Applications (2 references) to Group Secretary, Hospital Management Committee, Princes-road, Stoke-on-Trent.

STOKE-ON-TRENT. NORTH STAFFORDSHIRE ROYAL INFIRMARY. (455 Beds.) SENIOR HOUSE OFFICER (E.N.T.), vacant now.

Applications (2 references) to Group Secretary, Hospital Management Committee, Princes-road, Stoke-on-Trent.

STIRLING AND CLACKMANNAN HOSPITALS BOARD OF MANAGEMENT. SENIOR HOUSE OFFICER (general medicine). Applications are invited immediately for this non-resident post based on Stirling Royal Infirmary. The appointment will be for 1 year in the first instance.

Applications, giving age, qualifications, previous experience with dates, and names of 3 referees, should be sent to Secretary, 1, Randolph-road, Stirling.

STOCKPORT INFIRMARY, Stockport. (162 Beds.) Applications are invited for the post of SENIOR HOUSE OFFICER (Assistant Resident Surgical Officer), general and orthopædics. The post is recognised for the F.R.C.S.

Applications, stating age, experience, and qualifications, together with copies of 2 testimonials, to be addressed to the Secretary, Stockport and Buxton Hospital Management Committee, 59B, Shaw-heath, Stockport, Cheshire.

STOCKPORT INFIRMARY. Stockport and Buxton HOSPITAL MANAGEMENT COMMITTEE. Applications are invited for the post of SENIOR HOUSE OFFICER (anæsthetics). The post may be resident or non-resident (preferably resident) and is recognised for the D.A. and F.F.A.R.C.S. There are facilities for study.

Applications, stating age, experience, and qualifications, together with copies of 2 testimonials, to be addressed to the Group Secretary, Stockport and Buxton Hospital Management Committee, 59B, Shaw-heath, Stockport, immediately.

STOCKPORT. STEPPING HILL HOSPITAL. (490 Beds.) Applications are invited for 2 posts of RESIDENT SENIOR HOUSE OFFICER (surgery), vacant 12th April and 1st May, 1955. The posts are recognised for the F.R.C.S.

Applications, stating age, experience and qualifications, together with copies of 2 testimonials, to be addressed to the Secretary, Stockport and Buxton Hospital Management Committee, 59B, Shaw-heath, Stockport, Cheshire, immediately.

SUTTON. BELMONT HOSPITAL. St. Ebba's and BELMONT GROUP HOSPITAL MANAGEMENT COMMITTEE. SOUTH WEST METROPOLITAN REGIONAL HOSPITAL BOARD. Applications are invited for appointment as PSYCHIATRIC REGISTRAR at above Hospital which is principally concerned with the treatment of neuroses and the early psychoses. There are ample opportunities for research and the Hospital, which is recognised for the D.P.M. takes an active part in teaching in association with teaching hospitals. Candidates may visit the Hospital by appointment with the Physician-Superintendent.

Application forms may be obtained from the Group Secretary, Group Office, Belmont Hospital, Brighton-road, Sutton, Surrey, and completed forms (5 copies) should be returned to him within 2 weeks of the appearance of this advertisement.

SWINDON AND DISTRICT HOSPITAL MANAGEMENT COMMITTEE. VICTORIA HOSPITAL, SWINDON. Applications invited for post of RESIDENT SENIOR HOUSE OFFICER (anæsthetics) for the Swindon hospitals. Post is recognised for the D.A. Approved salary, conditions, &c.

Apply, with copies of 3 recent testimonials, to Secretary, 7, Okus-road, Swindon.

ST. ALBANS CITY HOSPITAL, St. Albans, Hertfordshire. (378 Beds.) HOUSE PHYSICIAN required for duties mainly in the Pædiatric Department. Post vacant approximately 12th April, 1955, and tenable for 6 months. Preference given to candidates seeking pre-registration posts under the Medical Act, 1950.

Applications to Secretary, Mid-Herts Group Hospital Management Committee, Bleak House, Catherine-street, St. Albans.

ST. ALBANS CITY HOSPITAL, St. Albans, Hertfordshire. (378 Beds.) Locum Tenens CASUALTY OFFICER required from 28th April to 15th May approximately.

Applications to Secretary, Mid-Herts Group Hospital Management Committee, Bleak House, Catherine-street, St. Albans.

TAPLOW, near MAIDENHEAD. CANADIAN RED CROSS MEMORIAL HOSPITAL. Applications invited for post of SENIOR HOUSE OFFICER to Special Unit for Juvenile Rheumatics. Scope for those interested in research, pædiatrics, rheumatology or cardiology, and previous experience in 1 of these desirable. Post now vacant and tenable for 6 months in first instance.

Applications, stating age, qualifications, experience with dates, with copies of 3 testimonials, to Hospital Secretary.

TORQUAY. TORBAY HOSPITAL. Resident Casualty OFFICER (Senior House Officer status) required 1st April, 1955. There is a complement of 5 Resident House Officers.

Applications (quoting reference F.955/53), stating qualifications, nationality, age, with copy testimonials, to the Group Secretary, Torquay District Hospital Management Committee, Torbay Hospital, Torquay.

TREDEGAR, MONMOUTHSHIRE. ST. JAMES HOS-PITAL (near Newport and Cardiff). (160 Beds for acute medical, obstetrics and geriatrics.) RHYMNEY AND SIRHOWY VALLEYS HOSPITAL MANAGEMENT COMMITTEE. HOUSE PHYSICIAN required by 11th April at above Hospital. Salary £425–£525, according to experience, less appropriate deductions for married quarters (if required).

Apply immediately to Group Secretary, Hospital Management Committee, St. Martin's-road, Caerphilly, Glam.

TYNEMOUTH VICTORIA JUBILEE INFIRMARY. (109 Beds.) SOUTH EAST NORTHUMBERLAND HOSPITAL MANAGEMENT COMMITTEE. Applications are invited from pre-registration or registered practitioners for the post of HOUSE SURGEON. Candidates with suitable experience will be considered for appointment in Senior House Officer grade.

Applications to Group Secretary, Preston Hospital, North Shields.

WAKEFIELD. STANLEY ROYD HOSPITAL. (Complete Nurse Training School for Nervous and Mental Disorders.) Applications invited for position of JUNIOR HOSPITAL MEDICAL OFFICER, vacant from beginning of July, 1955. Salary scale £775–£50–£1075. A flat is available in the Hospital for a single person. The charge for this accommodation, board, lodging, laundry, &c., will be £155 p.a. Facilities are available to attend at Leeds University for the purpose of obtaining the D.P.M.

Address written applications, giving full particulars and details of training, experience, &c., together with 2 names and addresses for reference, to W. BOWRING, Group Secretary, Victoria Chambers, Wood-street, Wakefield.

WALSALL HOSPITAL MANAGEMENT COMMITTEE. Locum HOUSE SURGEON required from Easter until end of July.

Applications to Group Secretary, General Hospital, Walsall.

WARLINGHAM PARK HOSPITAL MANAGEMENT COMMITTEE. Registered medical practitioners are invited to apply for the appointment of REGISTRAR. Opportunity will be given for experience in all branches of psychiatry, psychoneurosis, industrial psychiatry, delinquency, and child guidance. Candidates may visit the Hospital (by arrangement with the Medical Superintendent) but canvassing in any way will disqualify.

Application forms (5 to be completed) may be obtained from the Group Secretary, Warlingham Park Hospital, Warlingham, Surrey, on receipt of a stamped addressed envelope, and must be returned within 14 days of the appearance of this advertisement.

WATFORD. SHRODELLS HOSPITAL. (General Hospital—420 Beds.) Applications are invited for the post of SENIOR HOUSE OFFICER to the Geriatric Unit. Adequate time is available for reading.

Applications, together with copies of not more than 2 recent testimonials, should reach the Medical Officer-in-charge as soon as possible.

WELSH REGIONAL HOSPITAL BOARD. Senior REGISTRAR (thoracic surgery), Sully Hospital, near Cardiff (324 Beds). Thoracic centre for pulmonary tuberculosis and other chest diseases for South Wales. Resident/non-resident. Subject to review end of first year.

Application forms from Senior Administrative Medical Officer, Temple of Peace, Cathays Park, Cardiff, within 14 days.

WHITEHAVEN HOSPITAL, Cumberland. (124 Beds, plus 27 beds in Annexe.) HOUSE SURGEON, with orthopædic and casualty duties. (Recognised pre-registration, Senior House Officer grade if appropriate.) Vacant 1st May.

Detailed applications, with dates and copies of 2 testimonials, to Group Secretary, Workington Infirmary, Cumberland.

WIGAN. ROYAL ALBERT EDWARD INFIRMARY. HOUSE PHYSICIAN (Senior House Officer grade) for duty in the Paediatric Department at Wigan Infirmary, and also to undertake neonatal work at Billinge Hospital. Post recognised for D.C.H. vacant 1st April, 1955. Consultant Paediatrician in charge.

Applications, with names of 2 referees, to the Secretary, Royal Infirmary, Wigan.

WINDSOR. KING EDWARD VII HOSPITAL. Obstetric AND GYNÆCOLOGICAL HOUSE SURGEON required (Male or Female) for post vacant early May. Post recognised for both M.R.C.O.G. and D.Obst.R.C.O.G., not a pre-registration post. Successful candidate will be resident at Old Windsor Unit of the Hospital. Applicants required to be members of a Medical Protection Society.

Applications, stating age, nationality, qualifications with dates and copies of recent testimonials or names of 3 referees, to Hospital Secretary, by 7th April.

WISBECH. NORTH CAMBRIDGESHIRE HOSPITAL. (90 Beds.) NORTH CAMBRIDGESHIRE HOSPITAL MANAGEMENT COMMITTEE. HOUSE PHYSICIAN, vacant 4th April, 1955. Post offers very good all-round experience in general medicine, and is most suitable for anyone considering entering general practice.

Applications from registered or provisionally registered practitioners, naming 2 referees, to be sent to the Group Secretary.

WOLVERHAMPTON GROUP.

Wolverhampton Eye Infirmary (recognised for F.R.C.S. and D.O. examinations)

HOUSE OFFICER, vacant 1st April.

Apply Secretary, The Royal Hospital, Wolverhampton.

YORKSHIRE. EAST RIDING HOSPITAL MANAGEMENT COMMITTEE.

Westwood Hospital, Beverley, Yorks (229 Beds)

ORTHOPÆDIC HOUSE SURGEON (first, second, or third post). Offers good opportunity for general experience in busy acute general hospital. Approved pre-registration post. Fully qualified practitioners may apply. Recognised for F.R.C.S.

Apply to Group Secretary.

YORKSHIRE. EAST RIDING HOSPITAL MANAGEMENT COMMITTEE.

Broadgate Mental Hospital, Beverley, Yorks (650 Beds)

JUNIOR HOSPITAL MEDICAL OFFICER required.

Facilities for study. A flatlet is available in the Hospital.

Detailed applications to Group Secretary, Westwood Hospital, Beverley.

U.S.A. ST. ELIZABETH HOSPITAL, Elizabeth, N.J., U.S.A. (250 Beds.) Applications are invited to fill vacancies for 2 INTERNS to serve for 1 year. Hospital approved by A.M.A. Intern training being conducted. Salary $100 plus maintenance.

Apply Administrator.

NEW ZEALAND. THE OTAGO HOSPITAL BOARD, DUNEDIN, NEW ZEALAND. DEPARTMENT OF SURGERY. ORTHOPÆDIC AND TRAUMATIC UNIT, DUNEDIN HOSPITAL. Applications are invited for the position of SENIOR ORTHOPÆDIC REGISTRAR, to commence duties as soon as possible. The applicant must possess a higher qualification in surgery and have had extensive experience in orthopædic and traumatic surgery. His duties will include the teaching of Medical Students, Nurses and Physiotherapy Students. The appointment is for a minimum of 1 year and tenable up to 3 years, subject to termination by 3 months notice in writing from either side. The salary payable under the Hospital Employment (Medical Officers, Regulations 1952, Amendment No. 1), is £N.Z.806 5s. p.a., rising by annual increments of £N.Z.57 10s. to a maximum of £N.Z.921 5s. p.a., plus cost-of-living bonus of £N.Z.81 p.a. A living-out allowance of £N.Z.179 8s. p.a. is payable in addition to the above salary if non-resident. Travelling expenses are payable as stated in the conditions of appointment. Application forms and further particulars may be obtained from THE LANCET Office, 7, Adam-street, Adelphi, London, W.C.2, or from the Office of the High Commissioner for New Zealand, 415, Strand, London, W.C.2.

Applications, stating age, qualifications and experience, together with radiological and health certificates, and copies of testimonials, will be received by the undersigned up till 10 A.M. on Monday, 23rd May, 1955.

W. A. WILLIAMSON, Secretary.

Otago Hospital Board, P.O. Box 946, Dunedin, New Zealand.

NEW YORK, U.S.A. THE DOCTOR'S HOSPITAL. Applications are invited for the following posts :—

(1) 2 RESIDENT HOUSE SURGEONS.
(2) 2 RESIDENT HOUSE PHYSICIANS.
(3) 2 RESIDENT HOUSE OBSTETRICIANS.

All to commence on 1st. July. The monthly salary will be $300, with free board and lodging and laundry. Selected applicants will be expected to sign a contract for 1 year. Return passage by boat or plane will be paid for by the Hospital. Only post-registration graduates of British Universities who have done their military service or are exempt from it will be considered. Some previous experience in their subject is required.

Applications, giving details of experience, should be sent together with copies of 2 recent testimonials to : Address, No. 115, THE LANCET Office, 7, Adam-street, Adelphi, London, W.C.2, before 28th April. Further particulars can be obtained through this address.

U.S.A. BRIDGEPORT HOSPITAL, Bridgeport, CONNECTICUT. Approved ROTATING INTERNSHIPS available in a general hospital of 387 Beds and 60 bassinets ; approved residencies in medicine, surgery, obstetrics, pathology, radiology, and anesthesiology. Stipend of $190 per month in addition to full maintenance and uniforms. Exchange-visitor programme participant (P–619).

Address inquiries to Chairman, Committee on Medical Education of Interns and Residents, Bridgeport Hospital, Bridgeport, 10, Connecticut, U.S.A.

Public Appointments

NOTTINGHAMSHIRE COUNTY COUNCIL. East RETFORD BOROUGH AND EAST RETFORD RURAL DISTRICT COUNCILS. Applications are invited from registered medical practitioners for the mixed whole-time appointment of ASSISTANT COUNTY MEDICAL OFFICER AND MEDICAL OFFICER OF HEALTH of the East Retford Borough and East Retford Rural Districts. Applicants must have had at least 3 years professional experience since qualifying ; be experienced in the duties of Medical Officer of Health, School Medical Officer, and the care of mothers and young children and possess a Diploma in Public Health.

Salaries are in accordance with Awards 2285, 2231, and 2452 of the Industrial Court for Public Health Medical Officers holding mixed appointments, namely :—

(*a*) As Assistant County Medical Officer (23/44ths) £706 5s. p.a.–£32 2s. 1d.–£834 13s. 4d. (on scale £1100–£50–£1300, plus loading in accordance with Spens Formula).

(*b*) As Medical Officer of Health, East Retford Borough (8/44ths) £281 16s. 4d.–£9 1s. 10d.–£318 3s. 8d. (on scale £1450–£50–£1650, plus 8/44ths of £100).

(*c*) As Medical Officer of Health, East Retford Rural District (13/44ths) £457 19s. 1d.–£14 15s. 6d.–£517 1s. 1d. (on scale £1450–£50–£1650, plus 13/44ths of £100).

Application forms and conditions of appointment are obtainable from my office, and applications should reach me by 15th April, 1955. Canvassing disqualifies.

A. R. DAVIS, Clerk of the County Council.

Shire Hall, Nottingham.

LANCASHIRE COUNTY COUNCIL. Registered medical practitioners required for appointment of ASSISTANT DIVISIONAL MEDICAL OFFICERS in areas adjacent to Blackburn, Bolton-Bury, Lancaster, Leigh and Middleton. Possession of D.P.H. desirable. Salary £950–£1300 p.a. Travelling and subsistence allowances where applicable.

Application forms and further particulars from County Medical Officer, Serial 30, East Cliff County Offices, Preston.

LEEDS. CITY OF LEEDS. Public Health Department. Applications are invited from qualified and registered medical practitioners for the post of ASSISTANT MEDICAL OFFICER for Maternity and Child Welfare. Applicants should have had postgraduate experience, preferably including obstetrics, antenatal work, and pædiatrics. The salary scale is £950–£1300 p.a., with annual increments of £50. The person appointed will be required to pass a medical examination and to contribute to the superannuation fund.

Application forms and particulars of the duties may be obtained from the undersigned at the Public Health Department, 25, East-parade, Leeds, 1, and completed applications should be returned by 10 A.M. on Monday, 11th April, 1955. Canvassing, in any form, either directly or indirectly, will be a disqualification. I. G. DAVIES, Medical Officer of Health.

DERBYSHIRE COUNTY COUNCIL. County Health DEPARTMENT. ASSISTANT MATERNITY AND CHILD WELFARE MEDICAL OFFICERS AND SCHOOL MEDICAL OFFICERS. Applications are invited from registered medical practitioners for whole-time superannuable posts. Salary £950–£50–£1300 p.a. Car allowance.

Particulars and application forms obtainable from Dr. J. B. S. MORGAN, County Medical Officer, St. Mary's-gate, Derby, to whom they should be returned by 13th April, 1955.

GLOUCESTERSHIRE COUNTY COUNCIL. Cirencester URBAN COUNCIL, CIRENCESTER, NORTHLEACH AND TETBURY RURAL DISTRICT COUNCILS. Applications are invited for the post of DIVISIONAL MEDICAL OFFICER for the County, MEDICAL OFFICER OF HEALTH for the above-named districts and SCHOOL MEDICAL OFFICER. The appointments, which together are whole-time, involve approximately 2/5ths for each of the first-named appointments and 1/5th for the last named. The salary is in accordance with the Medical Council of the Whitley Council for the health services and is £1441 13s. 4d. p.a., rising by a differing number of annual increments according to the appointment to a salary of £1790. The selected candidate will be required to drive a motor-car, an allowance will be paid in accordance with the Whitley Council scale. The appointment is superannuable and the successful applicant is required to pass a medical examination. Applicants must hold a Diploma in Public Health and in respect of the County Council duties will act under the direction of the County Medical Officer of Health. The appointment will be subject to 3 calendar months notice on either side.

Applications, stating age, qualifications and previous experience, together with the names of 2 persons to whom reference may be made, should reach the Clerk of the East Gloucestershire United Districts Medical Officer of Health Sub-Committee, 5, Dyer-street, Cirencester, not later than 2nd April, 1955.

GUY H. DAVIS, Clerk of the County Council.
J. A. HALL, Clerk, East Gloucestershire United Districts, Medical Officer of Health Committee.
5, Dyer-street, Cirencester.

HER MAJESTY'S OVERSEA CIVIL SERVICE. Leprosy SERVICE—NORTHERN NIGERIA. MEDICAL OFFICER required to tour extensively throughout the Northern Region, Nigeria, supervising and inspecting Provincial Leprosy Settlements, Segregation Villages and Treatment Centres, to carry out epidemiological investigations and treat African staff. There is opportunity of clinical research. Selected officer will assist Senior Leprosy Officer in the organisation of Leprosy Control and in liaison with Medical Missions, and during Senior Leprosy Officer's absence he may be required to act as his relief. Candidates must possess medical qualifications registrable in the United Kingdom.

Appointments may be made as follows :—

(*a*) On 3 years probation for permanent and pensionable employment with retiring age of between 45 and 55. Pensions (which are non-contributory) are at the rate of 1/600th of final pensionable emoluments for each completed month of reckonable services.

(*b*) From the National Health Service. Candidates may resign from the National Health Service but retain their superannuation rights up to 6 years and receive a gratuity (taxable) of 20% of the aggregate of their salary. Salaries, including pensionable expatriation pay for officers appointed under (*a*) or (*b*) range from £950 to £1850 p.a.

(*c*) On short-term contract (2 tours of 18–24 months duration) with inclusive salary of from £1164 p.a. rising to £2150 p.a. ; on completion of contract a gratuity (taxable) at the rate of £37 10s. for each completed period of 3 months service (including leave) is payable.

Officers appointed under (*a*) or (*c*) are required to contribute to a Widows' and Orphans' Pension Scheme.

Starting salary in all cases depends on experience and war service. A revision of salaries is being undertaken in Nigeria and officer selected would benefit from any increase granted. Quarters are provided at low rents. Free passages in both directions are provided for officer and his wife. Payment of the cost actually incurred on 1 outward and 1 homeward passage for each of 2 children under age of 18, subject to maximum of £75 in respect of the return journey for each child, is also granted. Income-tax at low local rates. Local leave is permissible and generous home leave is granted after each tour of 18–24 months. The Northern Region of Nigeria has many attractions for Europeans. The climate is in the main hot and dry, and generally healthy for families. There are many recreational facilities, including riding and polo, tennis, golf and shooting, and the way of life of the 17 million Africans in the Region is interesting and often colourful. African leaders welcome the appointment of European doctors and are ready to assure them of a full career.

Application forms from Director of Recruitment, Colonial Office, Sanctuary Buildings, Great Smith-street, London, S.W.1 (quoting reference No. BCD.117/408/04).

INVERNESS COUNTY COUNCIL. Inverness Town COUNCIL. Applications are invited from registered medical practitioners holding the Diploma in Public Health or similar qualification for the appointment of DEPUTE MEDICAL OFFICER OF HEALTH, Inverness County Council and Inverness Town Council, and the ancillary post of POLICE SURGEON, Inverness Burgh. Experience in public health and school health administration essential. A house will be made available if required. Salary £1100–£1350 p.a., plus £80 p.a. in respect of the post of Police Surgeon, with placing according to qualifications and experience. Conditions of appointment may be obtained from the subscribers.

Applications, with copies of 3 recent testimonials should be lodged with the Medical Officer of Health, County Buildings, Inverness, by 9th April.

County Buildings, Inverness. R. WALLACE, County Clerk.
Town House, Inverness. J. CAMERON, Town Clerk.

MINISTRY OF LABOUR AND NATIONAL SERVICE. MEDICAL BOARDS AND DISABLEMENT ADVISORY COMMITTEES. From time to time vacancies occur in the panels of Medical Practitioners who are prepared to serve, as required, as members of National Service Medical Boards. Such Boards meet at intervals according to the requirements of the area and payment is on a sessional basis. A general practitioner wishing to be considered for any vacancy which might arise in the panel of the Medical Board nearest to the district in which he resides, should make his wish known to the appropriate Local Medical Committee or to the Secretary, Ministry of Labour and National Service, Baynard's House, 1–13, Chepstow-place, Westbourne-grove, London, W.2.

Occasional vacancies also occur in the membership of that Department's Disablement Advisory Committees and their Panels. A general practitioner wishing to be considered for such appointment should similarly apply to his Local Medical Committee or the Secretary, Ministry of Labour and National Service, 32, St. James's-square, London, S.W.1.

General Practice

For an Executive Council post (England and Wales) apply on form E.C.16A *obtainable from the council. Mark envelope "Vacancy."*

LITTLESTONE, KENT. Applications invited for Vacancy (rural). List at present approximately 2380. Residence and surgery available by purchase. Apply, on E.C.16A, before 9th April, 1955, to—

F. E. MILES, Clerk,
Kent and Canterbury Executive Council.
11, Station-road, Maidstone.

Hospital Services : Non-Medical Appointments

HERTFORD COUNTY HOSPITAL, Hertford, Hertfordshire. (173 Beds. 20 miles from London.) Applications are invited for the post of MEDICAL LABORATORY TECHNICIAN who must be qualified and well experienced in pathological histology. Whitley Council salary and conditions of service.

Apply, giving details of age, qualifications, experience, and names of 2 referees, to the Hospital Secretary.

Miscellaneous

To non-professional posts the Notification of Vacancies Order 1952 applies.

Institute of Child Psychology Ltd., 6, Pembridge-villas, London, W.11. Applications invited for Consultant Child Psychiatrist. 2 sessions weekly for clinical work and post-graduate teaching. Candidates must hold D.P.M. and have experience of Child Guidance work.—Apply, with names of 2 referees, to the Secretary.

Plastic Surgeon wanted, well qualified and trained, who would be interested in immigrating to the United States and taking out citizenship papers. To be associated with a large mid-western plastic surgery Clinic. Guaranteed minimum of $10,000 per year net. For right person, $25,000 net income with 2–3 years is assured. Must spend 6 months in Rotating Internship to fulfil requirements for State Laws. Private practice devoted entirely to plastic surgery—growing rapidly. Senior partner retiring. Write all particulars, including references and type and extent of general surgical training and when you would be available.—Address, No. 105, THE LANCET Office, 7, Adam-street, Adelphi, London, W.C.2.

M.A., M.D., requires part-time literary work, e.g., preparation of medical literature for pharmaceutical firm.—Address, No. 114, THE LANCET Office, 7, Adam-street, Adelphi, London, W.C.2.

Required : evening/night and/or weekend Locums in district accessible to West End.—Dr. PHILIP LEBON, Flat C, 20, New Cavendish-street, W.1. Please phone : WELbeck 5365.

Becoming vacant. Drs. serviced, equipped, well-furnished Consulting-rooms. Use of small Surgery. Terms arranged.—14, Herbert House, Herbert-crescent, Knightsbridge (SLOane 8014).

Upper-floor flat in Harley-street area, with consulting facilities, required by Teaching Hospital Consultant.–Address, No. 117, THE LANCET Office, 7, Adam-street, Adelphi, London, W.C.2.

Austin. The New Show Models A.30, A.40, A.50 and A.90. Limited number of deliveries to proven essential users.—Application form, brochures, easy terms from Austin House, 140–144, Golders Green-road, Golders Green, London, N.W.11.

A car for your needs—we can supply now : Standards 8 and 10 ; Zephyr Convertible ; T.R.2 ; Riley 1½ litre ; Morgan Coupe and others.—BASIL ROY LTD., 161, Gt. Portland-street, W.1 (LANgham 7733).

Typewriting and Duplicating. First-class work at moderate prices by experienced medical typists.—SYBIL RANG, 21, Heath-street, Hampstead, London, N.W.3 (HAM. 5329/0504).

Applicants for posts requiring testimonials copied or duplicated should communicate with MANTON SECRETARIAL SERVICE, LTD. 38, Victoria-street, S.W.1 (Phone : VICtoria 0141), who are specialists in this kind of work.

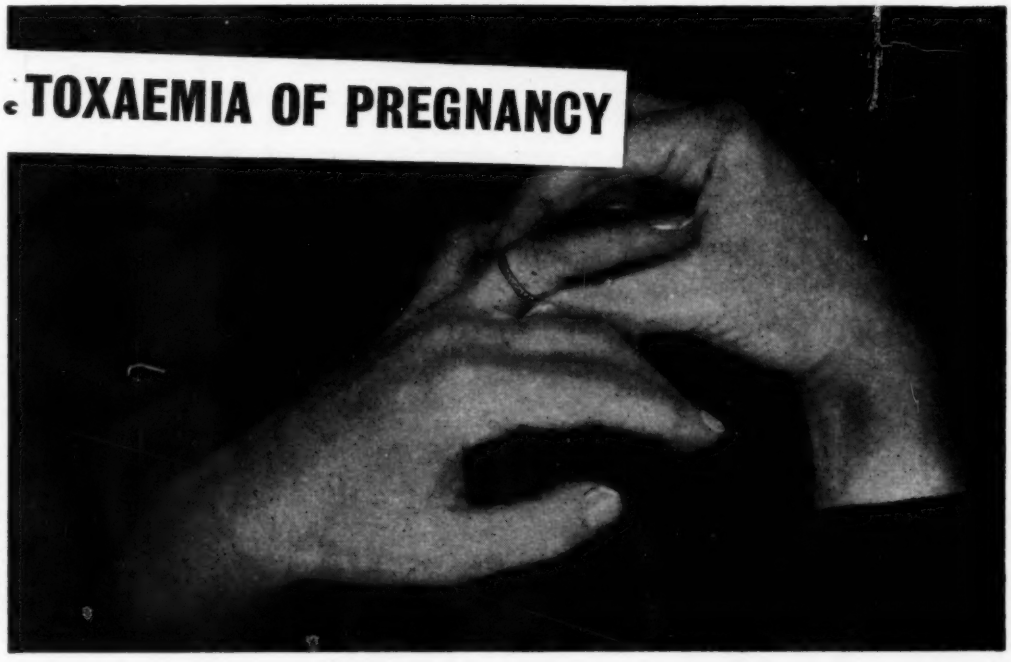
"Pregnancy Diagnosis by the Xenopus Method," 24-hour service. Send specimen of urine and £1 1s. fee. Hæmatology, Biochemistry, Flame Photometry.—WELBECK BIOLOGICAL LABORATORIES, 26, Park-crescent, Portland-place, W.1 (MUSeum 5386–7).

Medical books, old, rare, out-of-print. List free.—Walford, 186, Upper-street, London, N.1.

Professional, technical and personal typewriting. Duplicating, circularising, &c., efficiently and speedily executed.—"MOWBRAY," 146, Bishopsgate, E.C.2 (BIS. 2545, BAR. 7665).

PUBLISHED by the PROPRIETORS, THE LANCET LIMITED, 7, Adam Street, Adelphi, in the County of London.
Printed by HAZELL, WATSON & VINEY, LTD., London and Aylesbury—Saturday, March 26, 1955.
PRINTED IN GREAT BRITAIN—Entered as Second Class at the New York, U.S.A., Office.

TOXAEMIA OF PREGNANCY



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1. ACTA OBST. GYNEC. SCAND., 1950, *30*, suppl. 6.
2. BRIT. MED. J., 1954, *1*, 893.

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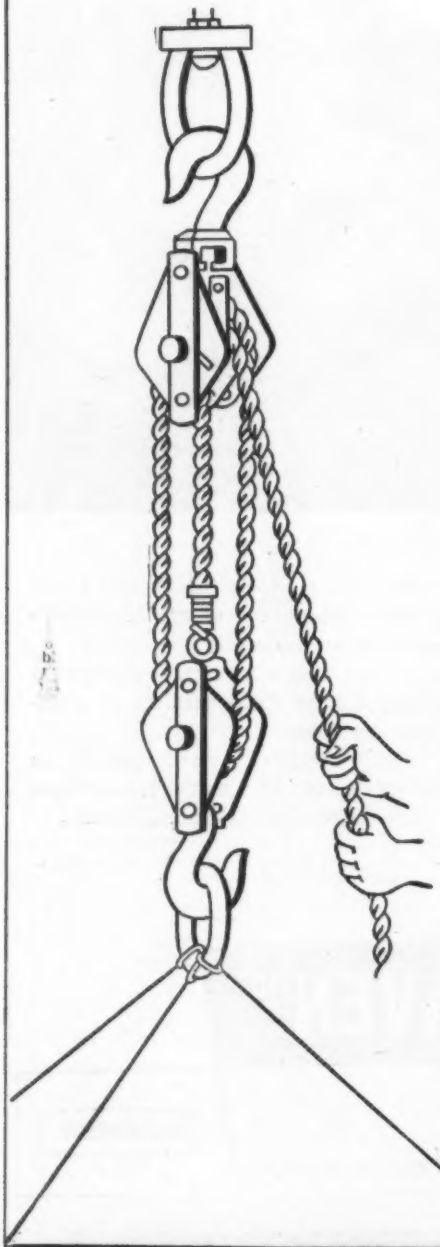

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